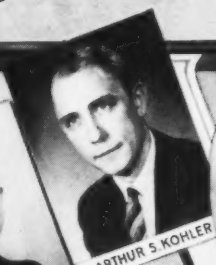
THE MONTHLY

Review

SEPTEMBER ◆ ◆ ◆ 1945

Over 20,000,000 Man-Hours of Labor, and $40,000,000 of Tax-Payers money has been saved by the efforts of CLEPO Service Men Cooperating with Manufacturing Concerns during the War.

ROLAND J. DOUCETTE

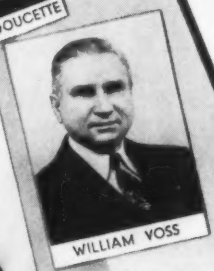

ARTHUR S. KOHLER

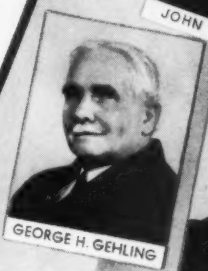
R. R. SIZELOVE

SYDNEY L. BOYAR

JOHN R. GUMM

JOHN M. BARRY


WILLIAM VOSS


GEORGE H. GEHLING

JOHN A. HONNECKER

These experienced technical men will give you the same assistance during this critical period of reconversion thereby GETTING YOUR PLANT INTO OPERATION FASTER saving you many Man-hours and Dollars on peacetime products.

RAYMOND J. BERGHOLD

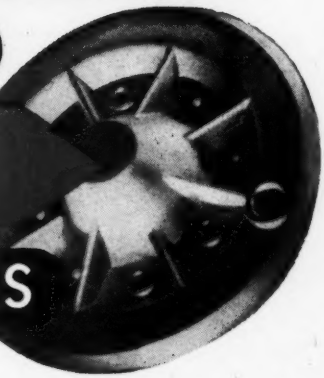
VINCENT T. CASSWELL

EDMUND S. JEVELY

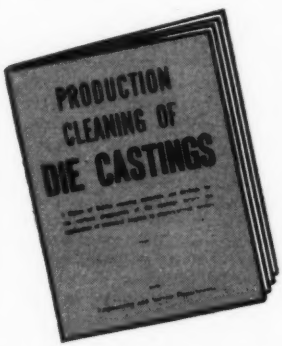
ROBERT L. TUTTLE

FREDERICK GUMM CHEMICAL COMPANY, Inc.
538-542 Forest St., Kearny, N. J.

CORRECT SURFACE PREPARATION *Reduces* FINISH FAILURES



● An important step in the production of die castings is the cleaning operation preparatory to applying a protective or decorative finish. The adhesion of this finish, whether organic, chemical or electro-plated, is largely dependent on the THOROUGHNESS of preliminary surface treatment. It is at this point that specialized Oakite materials and procedures can reduce costs and rejects and insure a satisfactory final finish.



Free Digest Gives Successful Data

● The data in this Digest include discussions of every practicable die cast alloy and the methods and materials best suited for the cleaning and surface preparation of each. The contents are based on the successful experiences of leading producers and users of die castings. Your copy is free for the asking; use it as a guide to make comparisons with your present methods.

● We'll be glad to send you a copy of the 12-page "Production Cleaning of Die Castings" immediately upon receipt of your card or letter. Write today . . . no obligation, of course.

OAKITE PRODUCTS, INC., 40 Thames St., NEW YORK 6, N. Y.

Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE *Buy Bonds for Victory* CLEANING

Color and Blacken Metals

TO PROTECT AND BEAUTIFY YOUR PRODUCTS

ALUMON

A simple dip process for preparing aluminum alloys for electroplating. Now, plentiful aluminum can be given beautiful finishes—gold, silver, nickel, chrome and metal oxidized finishes. One or two Enthone solutions added to your plating department will enable you to plate upon aluminum.

ALUMOX

A new chemical process for oxidizing aluminum to make an ideal base for organic finishes. No electric current is used. A dip in the warm Alumox solution for a few minutes is merely required. The grey-green iridescent finish is beautiful and durable in itself. It can be relieved by buffing or wire brushing to give attractive color contrast. Process cost less than one cent per square foot of aluminum treated. For buttons, buckles, eyelets, trays, vases, compacts, dress ornaments and for large objects where high paint adhesion is required.

EBONOL "C"

(U S. Patent No. 2,364,993) A process easily operated for blackening and coloring copper, brass and other copper alloys. Cupric oxide finish; stable, adherent and protective. Operating temperature 210° to 218°F

EBONOL "S"

A simple, one-way bath, easy-to-operate process for blackening and coloring iron and steel with a ferroferric oxide coating. Low operating temperature, 285-290°F

EBONOL "Z"

A blackening process for zinc and zinc alloys. Operated without expensive supervision. Coating is very stable and is an excellent base for organic finishing.

METAL COLOR PROCESS

This new process brings fresh eye-appeal to liven standard products. Colors are produced on Brass and Copper by oxidation at low temperature to give stable, adherent colors – *Yellow, Blue, Blue-Green, Old English, Statuary Bronze, Brown* and *Black*. The process works well on electro-plated brass, thus permitting the coloring of steel and other metals that can be brass plated. Treating cycles are short and bulk work can be processed in baskets or tumbling barrels.

■ *Literature available on all processes. Customer's samples finished and technical advice offered.*

Free!

New Four Color Brochure on Enthone Metal Coloring Process.

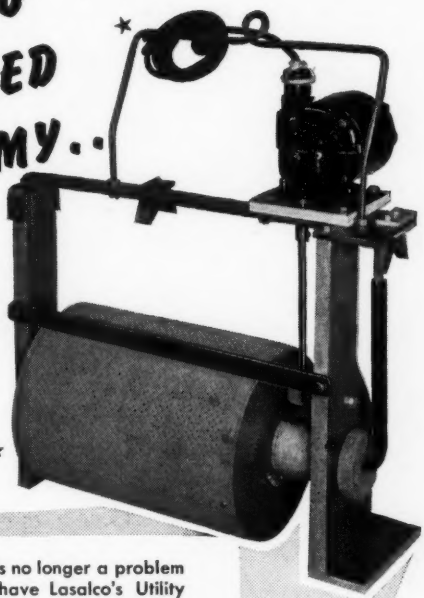
ENTHONE

METAL COLORING PROCESSES

THE ENTHONE Co.
Dept. MR
440 Elm Street, New Haven, Conn.

FOR PLATING ROOM SPEED AND ECONOMY..

CHECK LASALCO'S UTILITY BARREL PLATER!



FASTER and more uniform plating is no longer a problem in hundreds of plants who now have Lasalco's Utility Plater. Versatile, to handle any process required for small lots of varying grades and types of material, the Utility Barrel Plater is matched by no other equipment available in its price class.

INVESTIGATE THESE PROVEN ADVANTAGES

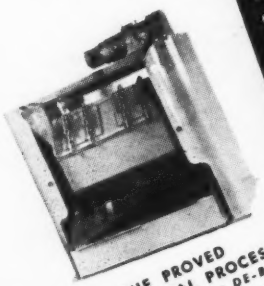
- Can be hung in any plating tank on the cathode rod and operated from the nearest light socket
- Easy to load and unload because of its extreme portability
- Nothing plates but the load—no "free-up" on the cylinder
- Less dragout loss because barrel revolves as it is lifted from solution
- Hand shifting of cylinder is entirely eliminated
- Rugged, durable, long-life operation is guaranteed by its heavy canvas base Bakelite construction
- Specially designed, sturdy, geared-type motor
- Cylinder sizes: No. 1—Dia. 6"x12" long; No. 2—Dia. 9"x12" long

Write Lasalco today and learn more of the advantages offered by the Utility Barrel Plater. Also ask about Lasalco's complete service on plating and finishing room equipment and material.

LASALCO, INC.

2818-30 LA SALLE STREET ST. LOUIS 4, MISSOURI

Roto-Finish Equipment

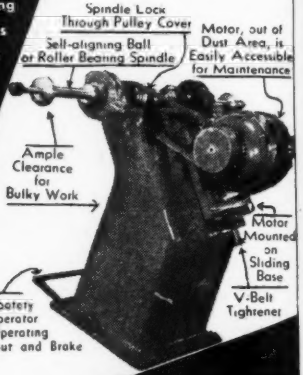


THE PROVED MECHANICAL PROCESS— FOR GRINDING • DE-BURRING POLISHING • HONING COLORING

ROTO-FINISH

An economical method of deburring on many production jobs. Maintains very close tolerances. If you have work which needs deburring, send us samples of both finished and unfinished parts with details of requirements. We will finish them — returning them to you with full data and our recommendations.

Stevens Safety Lathe


Spindle Lock Through Pulley Cover
Self-aligning Ball or Roller Bearing Spindle
Motor, out of Dust Area, is Easily Accessible for Maintenance
Ample Clearance for Bulky Work
Motor Mounted on Sliding Base
V-Belt Tightener
For Safety to Operator Foot Operating Motor Cut-out and Brake

GREEN SELECTRO-PLATER (Rectifier)

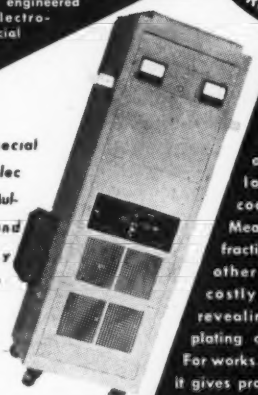
Wide range of capacities—25 to 5000 amperes all in one cabinet. Most capacities can be furnished in several types:—Standard (with meters and controls); Basic (without meters and controls); Remote Control (with separate remote controls and meters). Other variations may be engineered to adapt Selectro-Platers to special requirements.

FREDERIC B. STEVENS INCORPORATED
EVERYTHING FOR PLATING AND POLISHING
DETROIT · 26 · MICHIGAN

STEVENS SAFETY LATHE

When the operator's hands are busy the Lathe may be instantly stopped by slight pressure on the foot brake. Gives latest developments in operator's protection. Eliminates many injuries, with resultant loss of production time. *Write for booklet on this, and other Mitchell Buffing and Polishing Lathes.*

Write for special folder on Selectro-Platers, Multiplaters, and the Heavy Current Group.

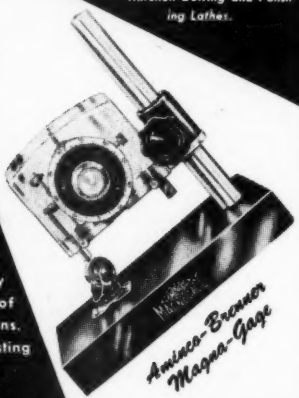


Green Selectro-Plater

MAGNA-GAGE

A rapid, non-destructive method of measuring local thickness of coatings on metals. Measurements made in a fraction of time required by other methods. Eliminates costly rejections by quickly revealing whether thickness of plating conforms to specifications. For works control or acceptance testing it gives profitable, positive results.

Write for Folder 2125.



FREDERIC B. **STEVENS** INCORPORATED
DETROIT • 26 • MICHIGAN

- NEW ENGLAND — 166-182 Brewery St., New Haven, Conn.
- NEW YORK and PENNSYLVANIA — 93 Stone St., Buffalo, N. Y.
- INDIANA — Hoosier Supply Co., 36 S. Cruse St., Indianapolis, Ind.
- CANADA — FREDERIC B. STEVENS OF CANADA, LIMITED — 1262 McDougall St., Windsor, Ontario — 2385 Dundas St. West, Toronto, Ontario

BUFFING COMPOSITIONS • METAL POLISHERS AND ELECTROPLATERS SUPPLIES-EQUIPMENT

THE MONTHLY

Review

VOLUME 32 • SEPTEMBER • NUMBER 9

Published Monthly at
192 JEFFERSON ST., PATERSON, N.J.
by AMERICAN ELECTROPLATERS SOCIETY

P.O. Box 168
Jenkintown, Pa.
Phone: Ogontz 4663

A. K. GRAHAM, *Editor*
K. G. SODERBERG, *Ass't Editor*
W. C. PINKERTON, *Business Manager*

ASSOCIATE EDITORS

DR. CHARLES FAUST
DR. WILLIAM BLUM
DR. RICHARD SALTONSTALL
DR. WALTER R. MEYER
CLARENCE HELMLE
E. R. HOLMAN
H. B. CASE
MYRON B. DIGGIN

A. E. S. OFFICERS

President: W. L. PINNER
Houdaille-Hershey Corp., Detroit 11, Mich.
First Vice-President: F. K. SAVAGE
C. G. Conn. Co., Ltd., Elkhart, Ind.
Second Vice-President: R. J. O'CONNOR
55 Anson Street, Stratford, Conn.
Third Vice-President:
KENNETH M. HUSTON
3208 Tyndale Avenue, Baltimore, Md.
Past President: M. R. CALDWELL
Doehler-Jarvis Corp., 1501 Paris Ave., S.E.
Grand Rapids 2, Mich.
Executive Secretary: A. K. GRAHAM
P.O. Box 168, Jenkintown, Pa.

CONTENTS

Walter S. Barrows, In Memoriam 878

Utilization of Available Materials for Nickel and Chromium Plating 879

SAVAGE—1946 Proceedings 879

RAUB AND KRAUSE—Structure of Electrodeposited Copper-Zinc Alloys 880

LIPSON—A New Coating Thickness Gage 888

FERGUSON AND STEPHAN — Adhesion of Electrodeposits II. Bibliography—A.E.S. Research Project No. 3 894

SAVAGE — Speakers for Branch Educational Activities 911

DEPARTMENTS

Industry News 925

Branch News 931

Membership Report 935

Branch Directory 945

Advertisers Index 955

Subscription: $3.00 a year
$.50 per Copy

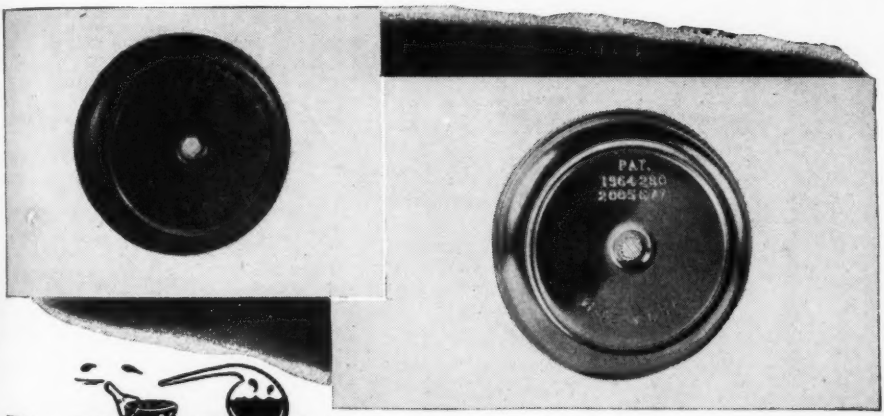
Entered as second class matter September 14, 1945, at the post office at Paterson, N. J., under Act of August 24, 1912.

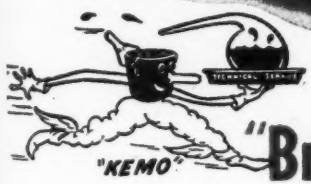
CLEAN BRIGHT BRASS CLEANER

• A new outstanding COWLES CLEANER for non-tarnishing cleaning of polished and unpolished brass, copper and bronze in still tanks with or without electric current—also in all types of washing machine equipment. Cowles K W does not attack the metal. It is fast, efficient and economical. Immediate shipment from warehouse stocks.

Cowles
TECHNICAL SERVICE on request

THE COWLES DETERGENT CO.
METAL CLEANER DEPT.
7016 EUCLID AVENUE • CLEVELAND 3, OHIO





"Bright as a Silver Dollar"

. . . . and Stays that way!

Shiny, too! In short, Luster-on* bright dip for zinc-plated parts is an economical finish, available now, that gives sales appeal and a protective coating in one simple application.

Study the unretouched photograph a moment. Notice how fingermarks and white corrosion have already marred and made repulsive the ordinary zinc plating. Then see the gleaming chromium-like brilliance of the Luster-on* dipped part. No dark smudges, no age stains, no white disfigurements for Luster-on* even resists salt spray exposure!

Tools, parts and other zinc-plated articles will find their place in present and postwar markets more easily with a Luster-on* finish.

KEMO SAYS: Send us a sample of your zinc-plated items for free processing with Luster-on*. See the improvement with your own eyes.

*Patent applied for

THE Chemical CORPORATION
54 Waltham Ave., Springfield 9, Mass.

THE CHEMICAL CORPORATION
54 Waltham Ave., Springfield 9, Mass.

Please send me full particulars about Luster-on* bright dip for zinc surfaces. I am (am not) sending sample part for free dip. No obligation, of course.

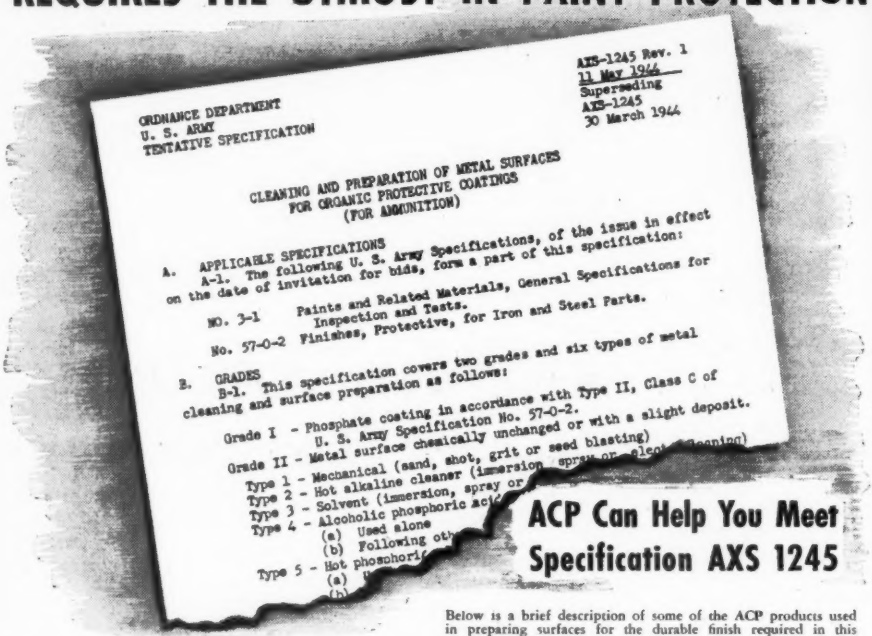
Name.....

Address.....

Monthly Review—e.o.

WAR IN THE TROPICS

REQUIRES THE UTMOST IN PAINT PROTECTION


ORDNANCE DEPARTMENT
U. S. ARMY
TENTATIVE SPECIFICATION
AXS-1245 Rev. 1
11 May 1944
Superseding
AXS-1245
30 March 1944
CLEANING AND PREPARATION OF METAL SURFACES
FOR ORGANIC PROTECTIVE COATINGS
(FOR AMMUNITION)
A. APPLICABLE SPECIFICATIONS
A-1. The following U. S. Army Specifications, of the issue in effect on the date of invitation for bids, form a part of this specification:
NO. 3-1 Paints and Related Materials, General Specifications for Inspection and Tests.
No. 57-0-2 Finishes, Protective, for Iron and Steel Parts.
B. GRADES
B-1. This specification covers two grades and six types of metal cleaning and surface preparation as follows:
Grade I - Phosphate coating in accordance with Type II, Class C of U. S. Army Specification No. 57-0-2.
Grade II - Metal surface chemically unchanged or with a slight deposit.
Type 1 - Mechanical (sand, shot, grit or seed blasting)
Type 2 - Hot alkaline cleaner (immersion, spray or
Type 3 - Solvent (immersion, spray or
Type 4 - Alcoholic phosphoric ac
(a) Used alone
(b) Following oth
Type 5 - Hot phosphori
(a)
(b)

ACP Can Help You Meet Specification AXS 1245

Our Technicians will be glad to assist you in adapting ACP products to meet Government Specification for metal cleaning and surface preparation for organic protective coatings. It is usually possible to adapt ACP products and methods of application to utilize your present equipment, thereby obviating delay and expense of new installations.

The experience of our technicians has enabled them to aid many manufacturers in overcoming serious difficulties in cleaning and conditioning ordnance as well as products for civilian use.

Below is a brief description of some of the ACP products used in preparing surfaces for the durable finish required in this specification.

DEOXIDINES—There are various grades and methods of application suited to the removal of varying amounts of rust and adapted to the different types of equipment in use.

DEOXYLYTE—For suitably adjusting the pH of rinse baths, properly, prior to painting.

RIDOSOL—An addition agent for improving detergent properties in emulsion cleaning.

PEROLINE—For preserving surfaces, in storage or transit, prepared properly for painting.

SOLVENT No. 3—Speeds stripping operations of paint, lacquer and enamel, in strong caustic baths.

RODINE—For inhibiting pickling acids.

Further information and technical data sheets will be forwarded on any of the above products. Address Dept. N-8.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.

ACP

AMBLER PENNA.

Office and Warehouse
3665 Palmer Ave., Detroit, Mich.

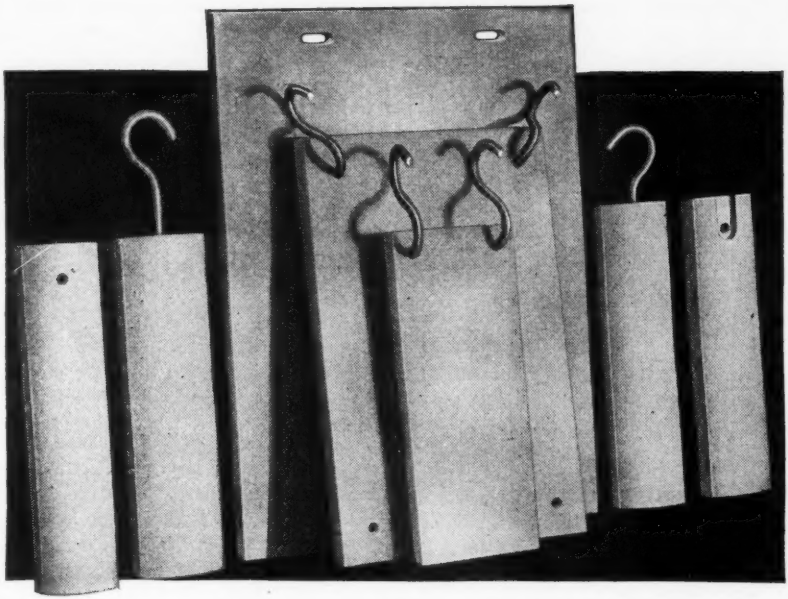
Canadian Office and Factory
Walkerville, Ontario

DISTRIBUTORS

West Coast
Leon Finch, Ltd., 728 E. 59th St.
Los Angeles, Cal.

Metropolitan New York Area
Bricker & Andes, 318 Atlantic Ave.
Brooklyn, N. Y.

Eastern Ontario and Quebec
Van Camp Products & Sales Co.
177 Parliament St., Toronto, Ont.



Enjoy all these advantages with *Anaconda Copper Anodes*

Anaconda Copper Anodes—whether Sheet, Oval, or Electro-deposited —contain less than 0.01 percent of total metallic impurities. This unexcelled high degree of purity pays you with the following advantages:

1 Copper goes into solution faster and more uniformly.
2 The highest quality deposit is produced in the shortest possible time.
3 Slime is reduced to an absolute minimum.
4 Spotting and discoloration of the deposit are eliminated.
5 Scrap losses are exceptionally low.

American Brass produces a complete line of Copper, Brass, and Bronze Anodes . . . rolled Sheet or Oval . . . cut to your own specifications or standard sizes . . . drilled or undrilled . . . with or without hooks—also Electro-deposited Anodes. For present or future reference, write for Publication C-5.

ANACONDA

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Conn. • *Subsidiary of Anaconda Copper Mining Company.* In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

Half-Done Isn't Enough

. . . do the Whole Job and do it Right

Catching dirt in electroplating solutions, like catching Japs, is a job that calls for thoroughness. Otherwise trouble is sure to result.

Filtration will catch suspended matter only; the impurities you can see. But Darco treatment will catch the trouble-making ghosts that can't be seen, and that filtration alone cannot remove. DARCO S-51 completely removes from the plating bath grease, oil, soap, colloids and other impurities that cause pitting, spots and poor adhesion.

Purification of a wide range of solutions — for bright nickels, cyanide zinc, cadmium, copper, iron, gold, silver — is being economically handled by DARCO S-51. Only a few cents worth keeps 100 gallons of solution clean for a week.

Darco activated carbon is a fine black powder. It is used in conjunction with a filter. For detailed directions send for copy of an article, "Physical Removal of Impurities from Plating Solutions."

Half-done cleaning causes trouble. Make the job complete with this activated carbon. Order DARCO S-51 from your dealer or write us for a sample. If you have a special purification problem, we'll be glad to help you solve it.

(This trademark identifies the genuine. Accept no packages without it.)

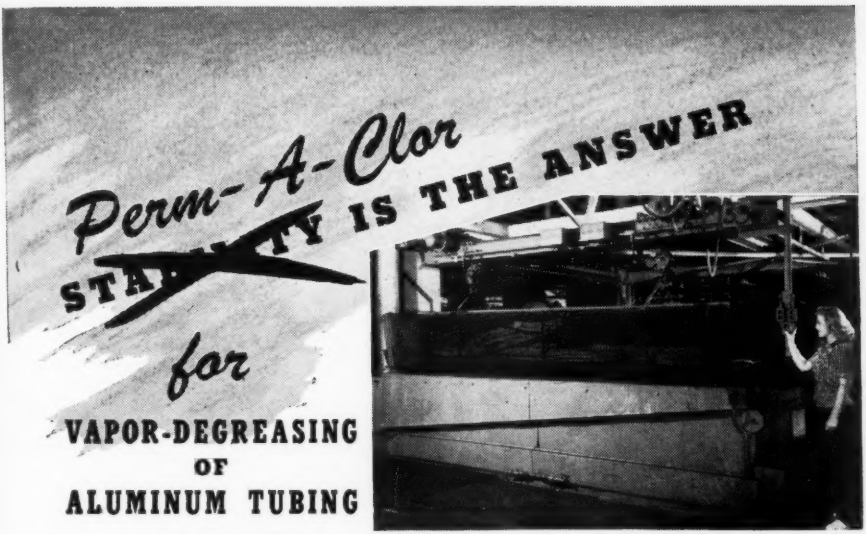
DARCO

DARCO CORPORATION

60 E. 42nd Street, New York 17, N. Y.

DARCO—REG. U. S. PAT. OFF.

Is Your Plating Bath as Clean as the Water Used in Your Final Rinse?



AND *All Tough* METAL CLEANING PROBLEMS

When the war jolted production of aluminum tubing into high gear, one west coast manufacturer immediately called upon a Detrex Service Man to help in analyzing his degreasing problem. Aluminum tubing—vital in aircraft production—required a solvent possessing the utmost in stability. The answer—PERM-A-CLOR. Today, after a record run of more than three and a half years, PERM-A-CLOR is still being used.

Having the highest stability of any degreasing solvent, PERM-A-CLOR is right for any combination of metals.

PERM-A-CLOR and Triad are stocked in the following cities:

Akron, O.	Fort Wayne, Ind.	Portland, Ore.
Baltimore, Md.	Grand Rapids, Mich.	Providence, R. I.
Birmingham, Ala.	Houston, Tex.	Reading, Pa.
Brooklyn, N. Y.	Indianapolis, Ind.	St. Louis, Mo.
Buffalo, N. Y.	Kansas City, Mo	Salt Lake City, Utah
Cambridge, Mass.	Lima, O.	Saginaw, Mich.
Charlotte, N. C.	Los Angeles, Cal.	San Francisco, Cal.
Chattanooga, Tenn.	Lockland, O.	Seattle, Wash.
Chicago, Ill.	Milwaukee, Wisc.	Somerville, Mass
Charlestown, Mass.	Minneapolis, Minn.	South Bend, Ind.
Cincinnati, O.	Nashville, Tenn.	Springfield, Mass
Cleveland, O.	New Haven, Conn.	Syracuse, N. Y
Dallas, Tex.	Newark, N. J.	Tulsa, Okla.
Dayton, O.	Niagara Falls, N. Y.	Toledo, O.
Denver, Colo.	Oakland, Cal.	Waterbury, Conn.
Detroit, Mich.	Philadelphia, Pa.	Worcester, Mass.
El Monte, Cal.	Pittsburgh, Pa.	

INVEST IN WAR BONDS

DETREX Corporation

13010 HILLVIEW AVE.

DETROIT 27 • MICHIGAN

Solvent Degreasers — Metal Parts Washers — Processing Equipment — Industrial Cleaning Chemicals.

A plating or anodizing rack is a tool—a tool that is as vitally important, in the efficient operation of your plating plant as are the prepositioning jigs and fixtures in a machine shop.

NANKERVIS racks are precision tools. Their dimensions are often held to tolerances of less than 1/10,000 of an inch in fabrication.

NANKERVIS racks are designed by engineers whose thorough, practical experience in rack building qualifies them as authorities on the subject. They are built in modernly equipped shops where craftsmanship and accuracy are the unbreakable rule.

Discuss your rack requirements with a NANKERVIS engineer. You will find it pays big dividends in the efficiency and stepped-up production of your metal finishing operations.

GEORGE L. Nankervis COMPANY

5408 COMMONWEALTH AVE. • DETROIT 8, MICHIGAN

COMPLETE METAL FINISHING EQUIPMENT

This ride through the fast waters with an expert guide, is as safe and sure as most any other mode of transportation because of his instinctive control, born of long practice . . . . The "Lo-Hi" pH process of chemically cleaning ferrous and non-ferrous metals preparatory to plating, makes practical a control in the plating room that gives management the know-what-to-plan-on the rest of the way in production. A comparatively small appropriation for this department (the bottle neck of most plants) will pay handsome dividends all the way down the line. . . . The findings of our laboratories and our experience in solving this problem for many manufacturers, is at your disposal.

LO HI

NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.

'32

pioneers in pH cleaning control—serving you since

NEW Speed and Economy on ALL Selective Plating Jobs with Pen-Kote MASKING LACQUERS

Eight Pen-Kote Masking Lacquers provide for faster, trouble-free production on *all* selective plating jobs—at appreciably lower cost. These new lacquers are regularly available for

- **HARD CHROME** stop-off (four superior coatings meet every requirement).
- **COPPER AND CADMIUM** stop-off—including high-temperature copper.
- **TIN AND ZINC** stop-off—where superior resistance to high-caustic solutions is required.
- **SILVER** stop-off—a lacquer of exceptional dielectric strength in high-cyanide solutions.

ALL Pen-Kote Masking Lacquers are easy to apply and unusually quick-drying. They adhere firmly, yet peel freely and are quickly removed after plating. They can't contaminate solutions or tarnish the work, and provide a durable, perfect protective coating of high dielectric strength.

WRITE TODAY FOR FULL DETAILS

Pen-Kote PRODUCTS

PENINSULAR CHEMICAL PRODUCTS CO.
6795 EAST NINE MILE ROAD
VAN DYKE • MICHIGAN

WITH MEAKER EQUIPMENT

You are ready for Quick Conversion to Peacetime Decorative Plating . . . . .

Choose the plating equipment you install for war work with an eye on quick conversion to peacetime decorative plating.

MEAKER Full Automatic Machines are most flexible, and can be readily adapted to handle different size racks through an entirely new sequence. Transfer mechanism may be moved or made wider, or "lift" increased at a nominal expense. Unit may be lengthened by adding new sections, without junking any considerable part of the old machine.

MEAKER Equipment is simple, compact, accessible, and oversize to stand continuous operation.

THE MEAKER COMPANY

1635 South 55th Avenue • Chicago 50, Illinois

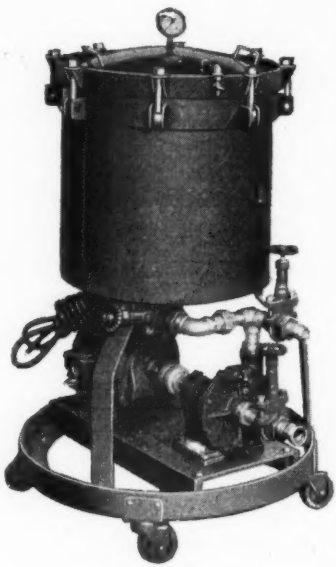
MEAKER EQUIPMENT

Straight-a-way Full Automatic Plating Conveyors
Return Type Full Automatic Plating Conveyor
Semi-automatic Plating Machine
Specially-designed Plating and Processing Machines
Strip Steel Galvanizing Lines
Round Wire Galvanizing Units
Motor Generator Sets · Copper Oxide Rectifiers

Take the ? out of your FILTERING with the *"Horizontal Plate"*

You will be surprised how uniformly clean and clear your plating solutions can be kept, as the Sparkler process removes every bit of abrasive material and dirt stirred up from the bottom of plating tanks.

Rough finishes, buffing, pittings and pin holes are eliminated. Sparkler Filters are comprised of perforated plates spun from one piece of metal. No messy screens to clog up, clean or replace. Filtering is fast dependable, finest quality. Adapted for any plain filter aid or activated carbon.



MANY MODELS
50 TO 10,000 G.P.H.

~

Write to have our district engineer call, or for any special information.

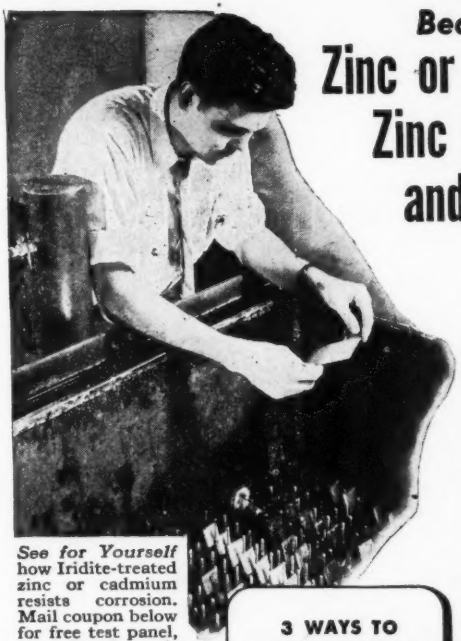
●

SPARKLER MANUFACTURING COMPANY

274 Lake Street **MUNDELEIN, ILLINOIS**

SPARKLER HORIZONTAL PLATE FILTERS

Beat Corrosion of
Zinc or Cadmium Plate, Zinc Die-Castings, and Galvanized
. . . with this new quick-dip process!



See for Yourself how Iridite-treated zinc or cadmium resists corrosion. Mail coupon below for free test panel, give it the salt spray test or any other corrosion tests you wish. You'll find Iridite can take it!

Looking for a fast, easy way to check corrosion on zinc die cast, zinc or cadmium plated or galvanized surfaces? Use Iridite! Iridite goes on with a quick dip of 15 to 60 seconds, plus a few seconds for drying . . . serves as either a final finish or paint base.

Wide Industrial Use

The Iridite process meets Army-Navy Aeronautical Specification AN-P-32, Army Ordnance Specification 57-O-2C for Type 1 finish, Navy Ordnance Specification OS-1374, and the equally exacting specifications of such leading manufacturers as Bulova, Sparton, York, Anaconda and many others.

Test Iridite Yourself

Send for free test panel, half of it protected by Iridite, and prove for yourself how Iridite balks corrosion . . . how the Iridite treatment does not alter dimensions of finely machined parts . . . how Iridited parts may be cold worked without flaking, chipping, peeling. Write today for your test panel.

3 WAYS TO BUILD PROFITS WITH IRIDITE

1 ***As a final finish,*** Iridite is available in a variety of attractive colors.

2 ***As a paint base,*** Iridite holds paint or clear lacquer firmly, even on newly galvanized surfaces.

3 ***To reduce costs,*** consider using galvanized, plus Iridite, in place of more expensive metals.

SEND FOR TEST PANEL

RHEEM RESEARCH PRODUCTS, INC.

IRIDITE

Standard Oil Bldg., Baltimore, 2, Md.

Keep faith with your fighters and yourself—Buy War Bonds for Keeps

RHEEM RESEARCH PRODUCTS, INC.
14709 Standard Oil Building
Baltimore 2, Maryland

Gentlemen: Please send me a free panel of Iridite-treated zinc plate for laboratory testing and full information and operating details.

Name .....

Company .....

Address .....

Walter S. Barrows

IT is with a feeling of sorrow that I inform you that Walter Barrows passed away as the result of a heart attack on Monday, July 16th, 12:20 A.M. While his death came as a shock to his many friends, it was not entirely unexpected since he had been in ill health for the past few years. From my personal knowledge his great interest in life was his calling and A.E.S. "His deeds will live long after him."

JOHN ACHESON
Toronto Branch

Another stalwart of the A. E. S. has passed on after a long useful career in the electroplating industry.

Walter Barrows early recognized the value of education for electroplaters and in 1912 organized the Toronto Branch of the National Electroplaters' Association, of which he served as President for several years.

He represented Toronto at the reorganization meeting in New York City in February, 1913 at which time the A. E. S. came into existence. He suggested the name "American." Taking an active part, he was chosen Second Vice-President of the A.E.S.

In 1914 he was elected First Vice-President and in 1915, President. His work as a builder of good will was only one of his splendid attributes.

The A.E.S. recognized Walter Barrows' ability and bestowed many honors on him, citations and a Gold Medal for papers presented at conventions and an honorary membership of the National Society.

His kindliness and his quiet, yet progressive nature endeared him to all his associates. His interest in electroplating was contagious and he made many friends by his helpful advice. His ability evident from his being foreman of the same plating plant for 40 years, seeing it grow to a large installation with all available improvements. He was not content to stand still and became one of the most progressive men in the electroplating industry.

GEORGE B. HOGABOOM, SR.

The A.E.S. sent a floral tribute to the funeral on July 18th. The accompanying card read "To a beloved and distinguished fellow member—A.E.S."

UTILIZATION OF AVAILABLE MATERIALS FOR NICKEL AND CHROMIUM PLATING

ON August 6th, the Detroit Branch held a meeting at which Mr. W. M. Phillips of General Motors Corp. gave an account of the supply situation of that date in nickel, nickel salts, and chromic acid. Detailed methods for utilization of available materials were presented by Mr. Phillips and Mr. L. G. Tubbs of Mutual Chemical Company. The statements and recommendations have been published by the Automotive Council for War Production and through its kindness a limited number is being made available to the Branch Secretaries for distribution to members of A. E. S.

Since this information was presented, the war has happily come to an end and the situation is now somewhat changed. Nickel as a raw material was shown to be in sufficient supply and it still is. However, it is presumed that there will be a rapid increase in the demand for nickel anodes and nickel salts. It is improbable that the suppliers can furnish immediately enough of these materials to satisfy everyone. In fact, we are inclined to believe that there will be a great scarcity, for the time being, of both anodes and salts. Cathode sheets will still be obtainable and the methods for making salts given at the Detroit meeting may be used.

The chromic acid situation will have been considerably relieved by the ending of the war. However, since chromic acid is still too scarce to satisfy all needs, the suggestion to use anodizing solutions and waste materials for chromium plating is still very much in line.

It was particularly emphasized that the user not buy or attempt to buy more of these items than are needed. Overbuying simply makes things difficult for the plating industry.

1946 PROCEEDINGS

—an AES Victory Job For You!

BECAUSE of the late action of the Office of Defense Transportation, it was necessary to postpone the 1945 Convention. An effort was made by the Executive Board at that time to insure the continued and uninterrupted publication of our Annual Proceedings, but those efforts failed because of the lack of sufficient time to explain our plans to the membership. It is with regret that an interruption occurred in the publication of the Proceedings, and it is definitely the intention of the present Executive Board that this shall not occur in 1946 whether a convention is held or not. A plan, as outlined below, we feel is adequate to create interest on the part of all the members and will insure the publication of a very fine book in 1946. It requires the cooperation of every member who is capable of writing technical articles.

1. Papers will be solicited and accepted for a 1946 Convention. If it is held, these papers will be presented and discussed in the usual way.

2. In case the convention is not held, each branch librarian will be notified of the titles of the papers and will be furnished with an abstract of the subject matter contained in them.

3. Each branch will be privileged and urged to request one, or more of these papers for presentation at a regular branch meeting, or preferably at a special educational session, by the author if possible, or by a member of the branch. The papers will be discussed and the discussions recorded as accurately as possible by the Branch Secretary or Librarian. All questions and discussions will be sent to the author for answers and comments before publication.

(*Continued on page* 906)

The Structure of Electrodeposited Copper-Zinc Alloys

This article has been prepared from a paper by E. Raub and D. Krause, Zeitschrift für Elektrochemie, **50**, 91 (1944). The original paper contains some interesting x-ray and microhardness studies of electrodeposited alloys, but the illustrations which are an integral part of the discussion are so poorly printed in the original that satisfactory reproductions of the photographs cannot be made. The pertinent information, however, is presented in abbreviated form as translated and condensed by Harold J. Read, Associate Professor of Metallurgy, Pennsylvania State College, State College, Pa. He is also responsible for rearranging and redrawing the curves which accompany the article.

Of the alloys deposited electrolytically, brass is today of the greatest importance. The deposits which are obtained in commercial practice are relatively high in copper and their compositions are in the region of alpha solid solutions. Recently there have been prepared high-zinc, "white" brass deposits whose composition corresponds to the epsilon phase of the copper-zinc system.[1] Finally, the so-called hard zinc deposits containing small amounts of copper have claimed some attention. Until now, fine structure investigations by means of X-rays have been carried out only for a few copper-rich alloys.[2] It has been shown that these alloys consist of mixed phases. In zinc-rich "hard zinc" deposits, W. Pfanhauser postulates the separate deposition of both metals as independent phases.[3]

The object of the present work was to ascertain the structures of the deposits over the whole range of copper-zinc alloys and to compare them with the phase diagram for these alloys. At the same time some information on the relationship between the properties of electrolytic and recrystallized alloys was obtained.

In line with their commercial importance, the electrolytic brass deposits have been investigated many times so that the influence of the working methods on the composition, properties and color has been determined.[4] Since, however, the existing publications embrace only a limited region of composition of the brass deposits and report only results with dilute plating baths which are not suitable for the preparation of the thick coatings desired for the present work, the operating conditions for the production of deposits of various compositions were briefly examined. The change in copper content of the brass deposits with current density at 20° and 30°C. was determined for several baths of varying composition. The most important results of this investigation are summarized in Figs. 1 to 3 and Table 1. For obtaining deposits still richer in either copper or zinc than those shown in the figures, baths were used in which the ratio of copper to zinc was shifted still further in favor of one or the other but were otherwise of the same composition as baths 1 or 2. The results shown in Figs. 1 to 3 were obtained in stirred baths of a volume of about two liters. The cathode surface area was 20 sq. cm. The baths were prepared from salts of technical grade.

The nature of the variation of the copper content of the deposits is practically the same at 20° and 30°C. In the region of low current densities the copper content falls off rapidly with rising current density. At current densities of 0.3 to 0.8 amp./sq.dm. it reaches a sharp minimum, but then rises again just as rapidly and finally at higher current densities changes but little.* Furthermore, Figs. 1 and 2 show the previously known shift of the composition of the deposits in favor of the zinc with increasing alkalinity of the bath.

The remarkable variation of the composition of the deposits with current density can only depend on changes of the deposi-

*L. C. Pan (Trans. Electrochem. Soc. **74**, 425 (1938) in the investigation of the influence of ammonia on brass deposition under other conditions found with increasing ammonia content a maximum leveling off at about one amp./sq. dm.

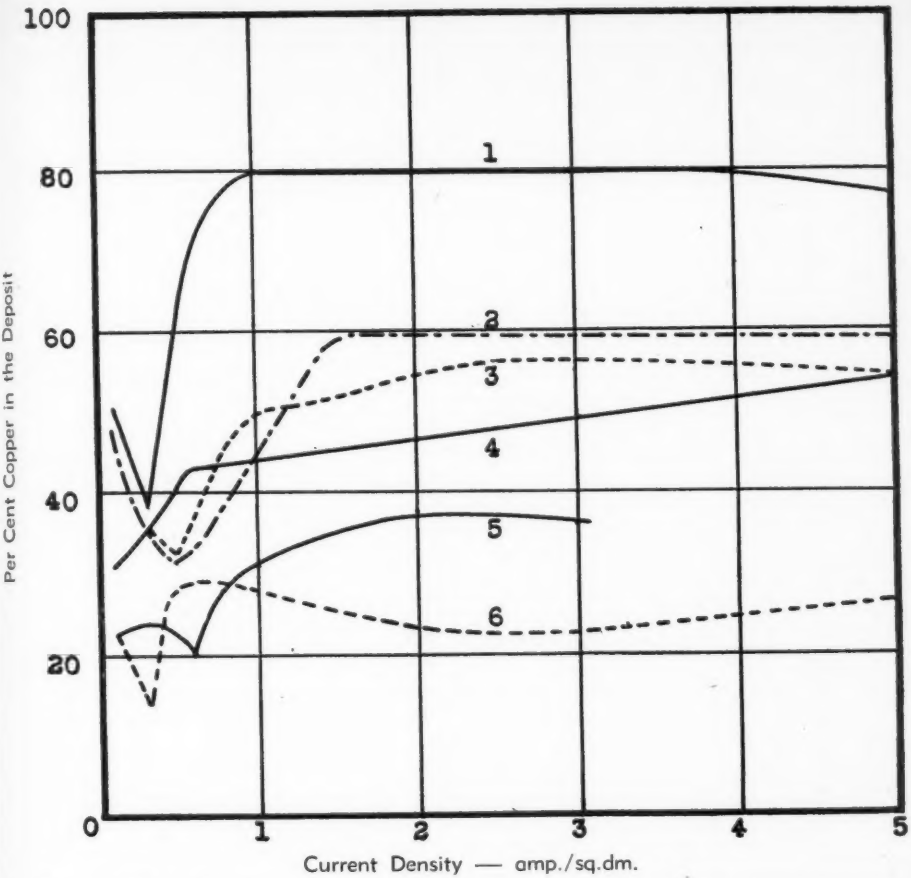


Fig. 1—Effect of current density on the copper content of electrolytic brass deposits made at 20°C. Curve numbers refer to the bath compositions given in Table 1.

TABLE 1

Composition of the Baths in grams/liter

Bath No.	*Cu as* $K_2Cu\ (CN)_3$	*Zn as* $K_2Zn\ (CN)_4$	*KCN Free*	K_2CO_3	*KOH*	NH_4Cl
1	20	10	9	30	—	2
2	20	10	9	30	10	—
3	20	10	9	30	20	—
4	20	10	9	30	40	—
5	20	10	9	30	100	—
6	9	17	32	—	67	—
7	CuCN 3 g./l.	$Zn(CN)_2$ 60 g./l.	NaCN 60 g./l.		NaOH 60 g./l.	

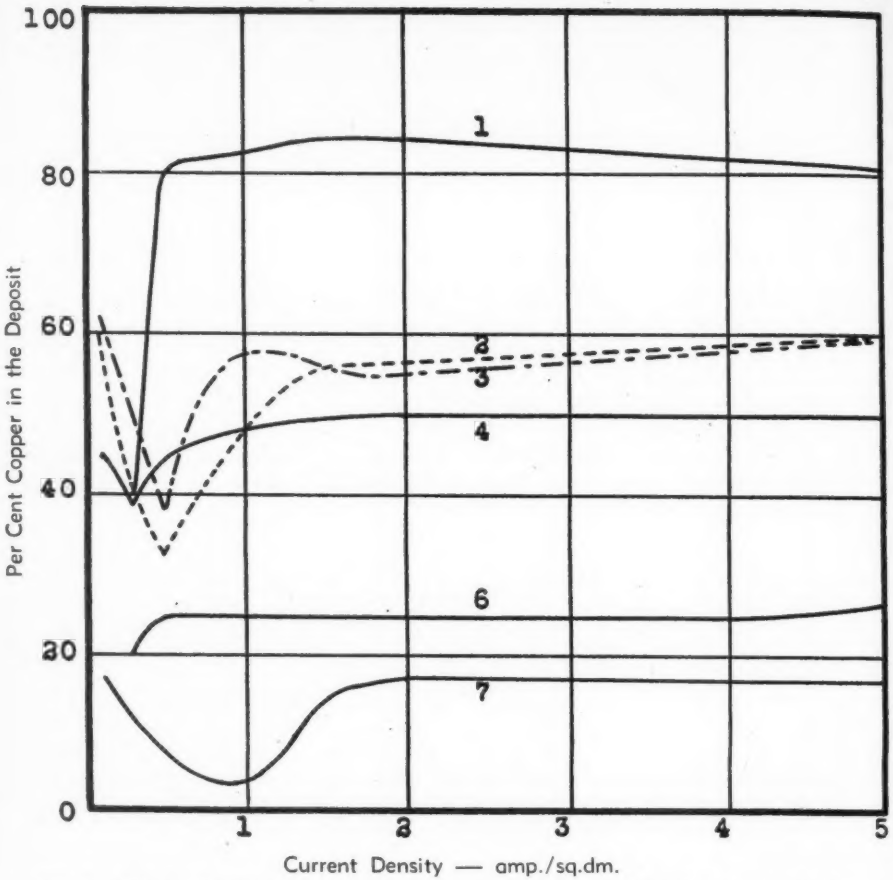


Fig. 2—Effect of current density on the copper content of electrolytic brass deposits made at 30°C. Curve numbers refer to the bath compositions given in Table 1.

tion at the point of minimum copper content. In order to prove this, cathode potential *vs.* current density curves were made. The operating conditions for the making of the potential curves were, of course, somewhat different than for the preparation of the deposits whose compositions are given in Figs. 1 to 3. The experimental baths were of 200cc. capacity. Copper-zinc anodes whose copper content was equal to that of the alloy deposited at the higher current densities were employed. Little brass coated silver blocks which were imbedded in Plexigum so that a surface of one square centimeter area was exposed, were used as cathodes for the taking of the potential curves.* As shown in Figs. 4 and 5, the curves are alike in a qualitative way and approximately similar quantiatively. A marked characteristic of the curves is the appearance of a point of inflection whose location changes with the composition of the baths. In the baths with low copper con-

*These cathodes provided the constant, easily reproducible surface which is necessary for the taking of potential curves. The use of Plexigum did not give results free from objection since in the alkaline electrolytes, particularly at high current densities and with strong hydrogen evolution, all lacquers and plastics flake away from the surface to some extent.

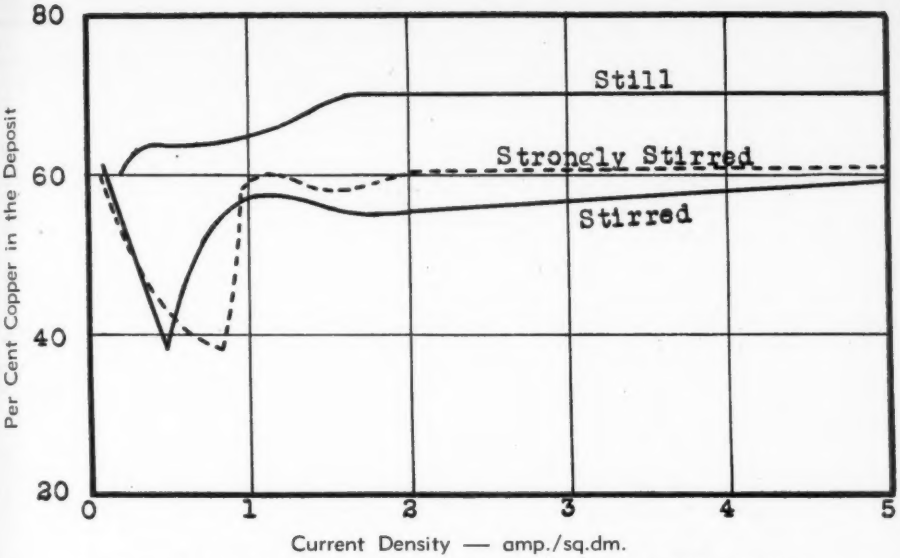


Fig. 3—Effect of stirring on the change in copper content of electrolytic brass deposits **vs.** current density. Bath No. 3 of Table 1 at 30°C.

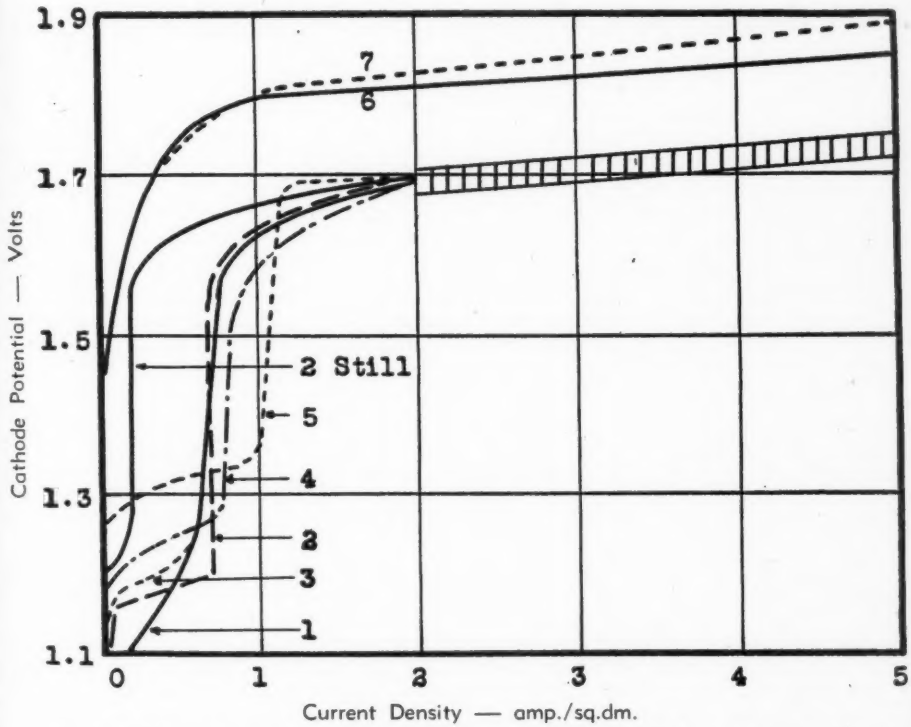


Fig. 4—Cathode potential **vs.** current density curves at 20°C. for brass baths whose compositions are given in Table 1. All baths were strongly stirred except as shown.

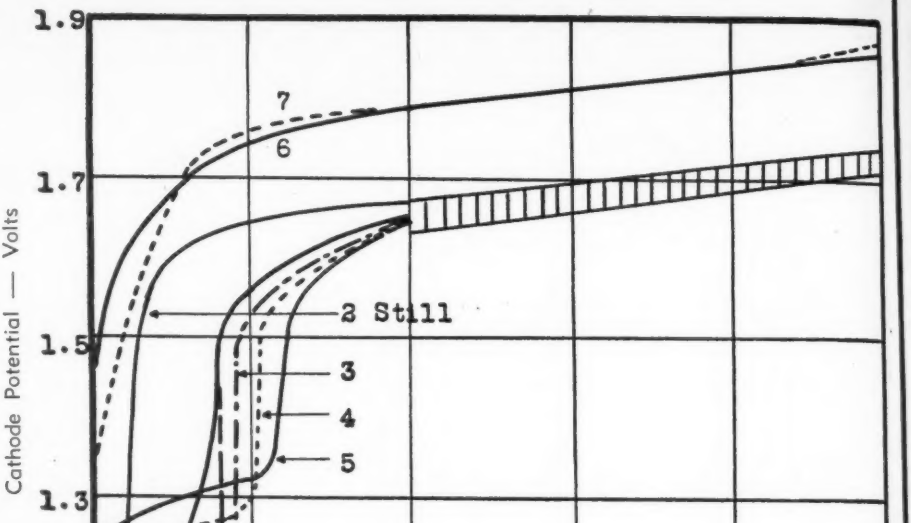


Fig. 5—Cathode potential **vs.** current density curves at 30°C. for brass baths whose compositions are given in Table 1. All baths were strongly stirred except as shown.

tent it is not very distinct, but in the copper-rich solutions it appears sharply. Raising current density to values above those corresponding to the point of inflection of the curve starts the evolution of hydrogen. A comparison of Figs. 1 and 2 with Figs. 4 and 5 shows that the first branch of the potential curves is coordinated with the first branch of the curves in Figs. 1 and 2 along which the copper content of the deposits falls with the increasing current density. The sudden change in the direction of the composition *vs.* current density curve appears with the further increase in current density up to the point where the hydrogen overvoltage is reached. To be sure, the location of the points of inflection in Figs. 4 and 5 deviate more or less markedly from the current densities corresponding to the minima of the copper content of the deposits as indicated in Figs. 1 and 2, namely, in the direction of higher values. This was later traced back to the fact that the point of inflection changes considerably with the operating conditions. The electrolyte was more strongly stirred for the making of the potential curves than in the determination of the compositions *vs.* current density curves. For this reason the points of inflection of the former were shifted in the direction of higher current density. In Figs. 4 and 5 the potential curves for bath No. 2 are given for both strongly stirred and still baths. It will be noted that the points of inflection were reached in the still baths at very low current densities. The composition *vs.* current density curves also shift in the same way as a result of agitation. Fig. 3 gives for bath No. 3 at 30°C. the composition vs. current density curves for still, stirred and strongly stirred baths. With strong agitation very copper-rich deposits were obtained at 0.1 amp./sq.dm. As the current density was in-

creased the copper content fell rapidly. The minimum was reached at a current density of 0.8 amp./sq.dm., a value which corresponded accurately with the point of inflection for the bath according to Fig. 5, whereas in the less strongly stirred bath the copper had already reached its lowest value at 0.5 amp./sq.dm. In the still bath the point of inflection occurs at such a low current density that the deposit obtained at 0.1 amp./sq.dm. was either at the minimum or on the rising part of the composition *vs.* current density curve, hence the first part of this curve was not observed.

At the electrolytically deposited zinc-rich alloys with a zinc content corresponding to the hexagonal phase of the copper-zinc system, the hydrogen overvoltage is as high as at pure zinc deposits.[5] At the copper-rich brass deposits the hydrogen overvoltage is smaller and changes little with the composition of the deposit.

For the determination of the structure of the galvanic copper-zinc alloys numerous specimens of various compositions were investigated by X-ray methods. From this it appeared that all phases which are found in the thermal equilibrium diagram can also be identified in the electrodeposited alloys. In the zinc-rich alloys copper and zinc do not appear to be deposited as independent phase since the patterns show the lines for the copper containing phases epsilon and eta. In comparison with the X-ray patterns of recrystallized specimens, those of electrolytic copper-zinc alloys are frequently less sharp and partially faded out. The hexagonal phases give, in general, rather sharp interference rings although with distinct broadening compared to the recrystallized alloy. With these even the weaker lines are still clearly present. In the X-ray patterns of electrolytic gamma brass the numerous weaker lines of the multi-lined pattern disappear more or less completely into the background fogging.

The determination of the phase boundaries for the electrolytic alloys was made especially difficult because frequently phases appeared side by side which were not to be expected from the average composition. This was observed microscopically as well as by means of Debye-Scherrer X-ray patterns. It is not possible even with the most rigidly controlled experimental methods to obtain a uniform composition throughout thick deposits, although by the investigation of a sufficiently large number of specimens it has been possible to establish approximately the phase boundaries for the electrolytic copper-zinc alloys. Table 2 gives the results of this investigation. For the sake of comparison, the values given in the literature for recrystallized alloys are also presented. It is seen that in the electrolytic alloys not only do the same phases

TABLE 2

Lattice Constants and Compositions of the Phases for the Copper-Zinc System for Electrolytic and Recrystallized Alloys

Phase	*Lattice Constants in A* a *for the cubic phase* $\sqrt{a^2c}$ *for the hexagonal phase*		*Zinc Content in At. %*	
	Literature Values for Recrystallized	*Electrolytic*	*Literature Values for Recrystallized*	*Electrolytic*
Alpha	3.608 — 3.696	3.608 — 3.691	0 — 38.5	0 — 37
Beta	2.944 — 2.952	2.942 — 2.955	45.5 — 51	45 — 53.5
Gamma	8.830 — 8.881	8.828 — 8.880	58.6 — 67.5	58 — 67.5
Epsilon	3.173 — 3.198	3.176 — 3.194	82.0 — 85.7	82.5 — 85.1
Eta	3.252*— 3.270	3.264 — 3.267	97.3*— 100	99.2 — 100

*At the peritectic temperature—424°C.

appear as in the thermal equilibrium diagram, but also according to the lattice constants, the phase boundaries agree with those of the diagram. It is emphasized that in agreement with the earlier experiments by U. Dehlinger[3] the super-lattice structure of the beta phase does not appear in the electrolytic alloys. Since this is the stable structure at room temperature, its formation during electrolytic deposition might well be expected, but instead, the unordered alloy which would normally be found at high temperatures is obtained.

It should be noted that none of the electrodeposited brasses contained the alpha phase with a zinc content which exceeded the saturation concentration indicated on the equilibrium diagram. This is in contrast to experience with the electrolytic deposition of silver-lead alloys where it was possible to build into the silver lattice, with corresponding lattice distortion, over 10% of lead in contrast to the less than 0.1% which can be held in the silver lattice under equilibrium conditions at room temperature.[6]

The X-ray interference rings produced by electrodeposited alpha brass are very strongly broadened. This can be attributed to the fact that the fluctuation of the composition in the deposited alloy may be quite large within the rather wide concentration limits of the alpha solid solution. This was confirmed by microscopic investigations. The microscopic structure of electrolytic brass deposits may vary considerably for the same composition, depending upon the working conditions for deposition. In spite of this, some typical structures characteristics of the phases can be found in thick deposits prepared without current interruption. Relatively large-grained structures are found in the hexagonal phases and in the eta phase.

The specific resistance and the microhardness were the two physical properties which were investigated. The method of Hanemann was used for the latter.

The resistance measurements were considerably effected by the porosity which often could not be avoided with thick deposits. The best specimens for resistance measurements were prepared from alloys with 100 to 70% and 30 to 0% Cu.

As far as thick specimens were concerned, the resistance measurements gave values which were always slightly under those quoted in the literature for recrystallized alloys of the same composition. This could be explained by the fact that since the composition of the alloy varied somewhat from point to point within the specimen, it would in consequence behave like a body composed of several parallel conductors.

The microhardness values for the electrolytic alpha solid solution are over twice as high as for the recrystallized alloy. In the other phases, which have high hardness values in the recrystallized condition, the microhardness of the electrodeposited alloys is not much above that of the corresponding recrystallized alloys; in some determinations it was even less. The hardest phase in the recrystallized alloys, gamma brass, also showed the highest microhardness when electrolytically formed.

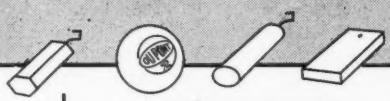
In recrystallized solid solution alloys the hardness commonly rises more or less markedly with increasing saturation, and this is true for the alpha phase of the recrystallized copper-zinc alloys. This variation of the hardness with composition does not occur with electrolytically prepared alpha brass. The concentration of the dissolved component is not the deciding factor in the hardness of electrolytic alpha brass; instead, this property is governed much more closely by the lattice distortion which occurs during electrolytic crystallization. The hardness increase associated with the lattice stretching caused by the entrance of zinc into the copper lattice, is slight in contrast to that caused by the derangement of the crystal structure and is masked completely by the latter.

In electrodeposited metals and alloys the structural faults which usually occur during deposition will remain since they are formed at temperature where the atomic mobility is very small and place changing processes in general do not occur. This is in direct contrast to alloys formed from melts. In electrolytic crystallization the working conditions for deposition have a definite influence on the structural faults in the metal lattice. In this connection the codeposition of non-isomorphous impurities must also be included. For solid solution

(*Continued on page* 938)

. . . get DU PONT anodes!

For every Du Pont Plating Process, high-quality Du Pont Anodes are available. They come in standard designs. And you can get them *fast* from stocks in principal cities. Check the list below for your requirements!



METAL	TYPE	DESIGN & HOOKS
CADMIUM	Bar	Elliptic, hexagonal, straight or curved with barbed steel splines
	Ball	2" diameter
ZINC	"Durobrite" or "Zin-O-Lyte"-zinc magnesium alloy for still & barrel plating	Bar with flat or barbed steel splines; 2" balls
	Du Pont Ball—High Grade Zinc	2" diameter marked to distinguish from ball anodes of other metals
	High Grade	Bars, with flat or barbed steel splines
	"Purezinc"-Intermediate Grade Zinc	Bars, with flat or barbed steel splines
	"Duozinc"-Zinc Mercury Alloy	Bar, with flat or barbed steel splines
COPPER	High Speed Copper	2" balls; Flats; High Speed anode hangers
TIN	"Pur-O-Tin"	Flat; hexagonal; ball
NICKEL	Rolled Depolarized, 99%	Elliptic—straight or curved
	Rolled Carbon	Elliptic
LEAD	Bar	Hexagonal, with flat or barbed steel splines
BRASS	80-20 and 70-30	Rolled, ovals—Drilled & tapped for hooks; flats in rectangular cross section drilled for hooks. Copper hooks.

ORDER *NOW!* Du Pont Technical Service is ready to assist you on the best use of these anodes and on the Du Pont Plating Processes with which they go hand in hand. For more details, just contact our nearest District Office, or E. I. du Pont de Nemours & Co. (Inc.), Electroplating Division, Wilmington 98, Delaware.

ONE PINT OF YOUR BLOOD
MAY SAVE A FRIEND'S LIFE!

DU PONT
CHEMICALS · PROCESSES · SERVICE
for **ELECTROPLATING**

DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

A NEW COATING THICKNESS GAGE*

By S. LIPSON[1]

LOCAL thickness measurement of coatings on steel by magnetic means is generally considered to be superior to other methods of coating thickness measurement because of its rapidity and nondestructive nature. At the present time two instruments for this purpose have found wide use in this country. One, the Brenner Magne-Gage,[2] developed by the National Bureau of Standards and manufactured by the American Instrument Co., employs a sensitive spring balance to measure the force required to withdraw a permanent magnet from the surface of the coated article. The instrument may be calibrated to indicate coating thickness since the thinner the coating, the greater will be the force necessary to effect separation.

The other, manufactured by the General Electric Co., is an electromagnetic instrument which measures coating thickness by the amount the flux of a magnetic circuit is reduced by the coating when it comes between the pole pieces of the core and the steel basis metal. Values are obtained directly from a suitably calibrated ammeter.

An alternative coating thickness measuring instrument for nonmagnetic coatings on steel has been developed at Frankford Arsenal and is described herein.

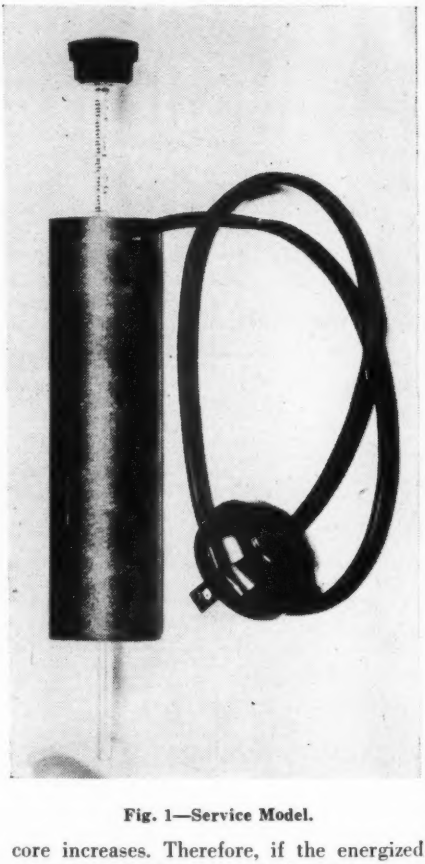


Fig. 1—Service Model.

Principles of Operation

The instrument under discussion requires a source of alternating current which is used to energize a solenoid containing a movable iron core.

If the core is withdrawn from the field of the solenoid, the magnetic pull on the core increases. Therefore, if the energized solenoid is held in a vertical position over a coated steel article and lowered sufficiently to permit the lower end of the core to contact the surface, the distance through which it may be raised for the pull of the solenoid to overcome the attraction of the core for the basis metal will vary inversely with the thickness of the coating.

Design of Instruments

Two experimental instruments were constructed; one was designed for hand-eleva-

*Published with the kind permission of the American Society for Testing Materials.

1. Metallurgist, Frankford Arsenal, Philadelphia, Pa.

2. A. Brenner, "Magnetic Method for Measuring the Thickness of Nonmagnetic Coatings on Iron and Steel," "Journal of Research," Nat. Bureau Standards, Vol. 20, No. 3, March, 1938, p. 357. (RP 1081.)

tion of the coil and the other for mechanical elevation. The latter instrument was intended, primarily, for use in gathering the data, since greater reproducibility was anticipated, while the former was constructed to test the dependability of a simplified design. Hereafter the former will be referred to as the "service model" and the latter as the "research model."

Service Model:

The service model (Fig. 1) consisted of a solenoid which was made by winding approximately ½ lb. of No. 36 enameled copper wire on a bobbin 3½ in. long having a central hole large enough to admit a $\frac{3}{16}$-in. diameter glass tube. An indicating scale was engraved in the upper portion of the tube, and a variety of soft iron cores were made which would slide loosely into the bore of the tube. An indicator, made of light cellulose acetate rod, was attached to one end of the core. Figure 5 shows a schematic representation of this construction.

When the core is in an equilibrium position in the energized solenoid, its location with reference to the lower edge of the tube can be noted by reading the position of the indicator with reference to the scale.

The instrument is operated by energizing the solenoid (a. c. source), grasping the knob at the end of the tube between the thumb and the forefinger and supporting it in an approximately vertical position. The other fingers are permitted to rest on the side of the tube and help control the speed with which the solenoid is raised, especially just before separation is anticipated. Readings are obtained by raising the coil with the other hand and reading the position of the indicator in relation to the scale when the core has come to rest after being sepaarted from the specimen. Just before separation is effected the chattering of the core (due to the alternating current) warns the operator to proceed slowly from this point. The discontinuance of the chatter plus the appearance of the indicator in the view of the operator signifies the end point.

Research Model:

The research instrument (Fig. 2), designed for mechanical elevation, was constructed in a manner similar to the service model except that the solenoid was placed in the tube of a microscope from which the objective and eyepiece had been removed. The $\frac{3}{16}$-in. diameter glass tube was fittted with a vernier scale at its upper extremity and a vertical scale, arbitrarily graduated from 0 to 50, was mounted on the tube so that the vernier would move parallel to it. It is to be noted that an indicator on top of the core was not employed in this instrument.

Determinations are made by placing the specimen beneath the solenoid so that the bottom of the glass tube rests on its surface. The solenoid is then lowered by means of the screw on the microscope stand, until the screw contacts the surface of the specimen, and is then raised again, until separation of the core is effected. Warning of this occurrence is given the operator in the same manner as when the service model is used.

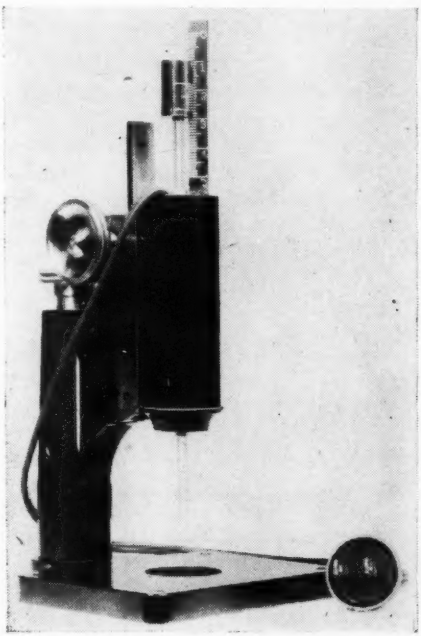


Fig. 2—Research Model.

Calibration

Calibration of the research model necessitated an investigation of the effect the following variables exercised on the accuracy and reproducibility of the determinations:

(*a*) Voltage.
  1. Line-voltage fluctuation.
  2. Solenoid voltage.
(*b*) Core size.
  1. Length of core.
  2. Diameter of core.
(*c*) Heating of coil.
(*d*) Miscellaneous factors.
(*e*) Reproducibility (uncontrolled factors).

Methods of Calibration and Results

The instrument was connected to a Variac[3] and an a-c. voltmeter was inserted in the circuit to measure the potential across the solenoid. The following National Bureau of Standards coating thickness standards of nonmagnetic coatings on steel were used in the calibration:

Standard	Coating Thickness, (in.)
N.B.S. AA 1017	0.00023
N.B.S. AB 915	0.00053
N.B.S. AC 973	0.00114
N.B.S. AF 133	0.00138
N.B.S. AD 1021	0.00195
N.B.S. CB 118	0.00325
N.B.S. CC 36	0.0052
N.B.S. CV 153	0.0087

(*a*) *Voltage:*

1. *Line-Voltage Fluctuation.* — Normal Frankford Arsenal line-voltage fluctuation was found to have a negligible effect on the instrument. Figure 3 shows average values obtained during a test period of 100 min.

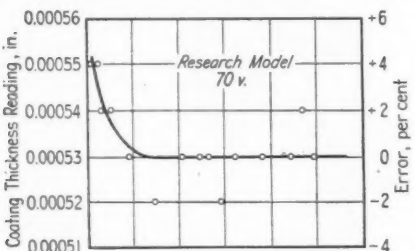


Fig. 3—Influence of Time on Thickness Reading.

The change in reading during the first 20 min. of test was found to be due to the heating of the coil and will be later discussed in greater detail. Error attributable to voltage fluctuation during this test period did not exceed ±1 per cent.

2. *Solenoid Voltage.* — The sensitivity of the instrument to line-voltage variations such as may be expected in a-c. power lines was determined. Figure 4 shows the effect of voltage variation (60 to 75 v.) on readings obtained with the research model instrument. It is noted that significant differences are attributable to voltage changes and that calibration of the instrument would be required at the beginning of each test period.

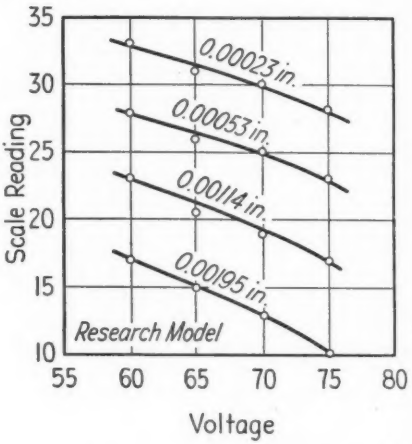


Fig. 4—Influence of Voltage on Scale Reading.

In studying the physical effect of voltage changes on the instrument, it was noted that an increase in voltage caused the core to be drawn further into the solenoid; also that the position of the solenoid at the instant of separation was somewhat lower with reference to the lower edge of the guide tube.

Since the first effect tends to cancel the second, it was thought that if both were considered, there might be a certain voltage range where the former would compensate for change in the latter. A comparison was therefore made of values obtained by noting the position of the indicator (service model) and noting the position of the solenoid when separation of the core was effected.

3. General Radio Co.

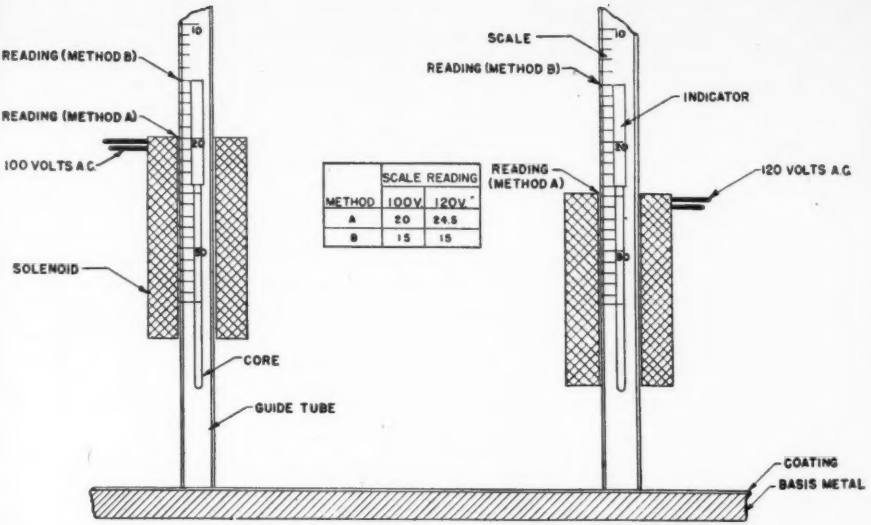


Fig. 5—Comparison of Reading Methods for Coating Thickness Instrument.
NOTE—Voltage compensating effect of indicator (Method B).

Figure 5 shows the anticipated effect of the compensating indicator. Figure 6 demonstrates the experimental verification of the hypothesis and shows that for voltage changes from 80 to 120 v. no significant change in scale reading occurs when the compensating indicator is read.

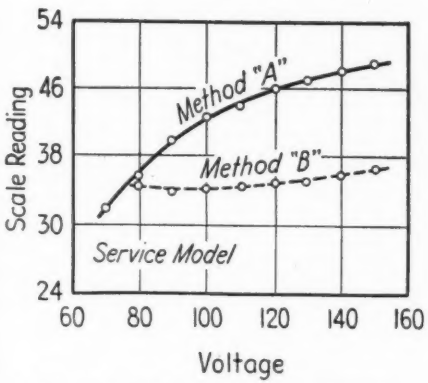


Fig. 6—Influence of Voltage on Different Reading Methods.

(b) Core Size:

The effect of length of core on the calibration was explored by taking a long core and determining the change in calibration effected by shortening it. The original point contour (hemispherical) was retained during this test by shortening the core from the upper end. Figure 7 graphically demonstrates this effect.

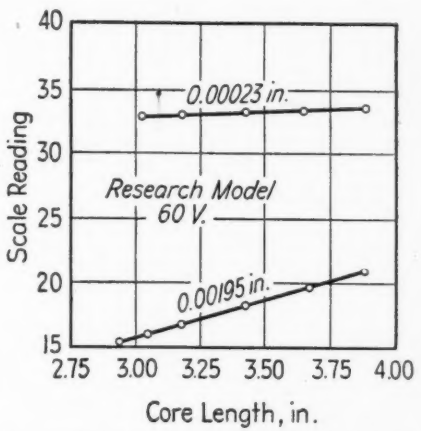


Fig. 7—Effect of Core Length on Scale Reading.

It is noted that as the length of the core diminishes there is a broadening effect on the scale. This is accompanied by a tendency to raise the range, since by the time the length of the core has been reduced to $2\frac{1}{8}$ in., values for the 0.00023-in. thickness standard could no longer be obtained.

The greatest core diameter possible has been found to be most desirable; however, this is limited by the design and efficiency of the solenoid. With the coils used for these experiments, a 0.062-in. diameter core was employed. Figure 8 shows a typical calibration covering the range from 0 to 8 mils.

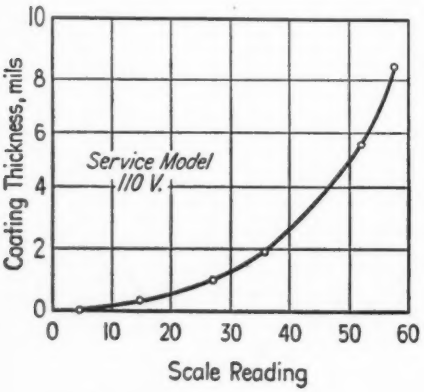


Fig. 8—Typical Calibration Curve for Nonmagnetic Coatings on Steel.

(c) Heating of the Coil:

The heating of the coil is naturally dependent on its design, gauge of solenoid wire, impressed voltage, etc. The coils used for these experiments showed only a small error attributable to changes in solenoid temperature from room temperature to its operating value. Figure 3 shows the magnitude and duration of this effect. It is believed that the 2% maximum error at the beginning of the test period may be materially lessened by increasing the number of turns in the coil.

(d) Miscellaneous Factors:

This instrument is, of course, heir to many of the difficulties encountered by other magnetic type coating thickness instruments. The composition, heat treatment and structure of the basis metal all affect the scale readings to varying degrees. However, since an overwhelming proportion of finished steel article are fabricated from mild steels, a calibration for this material would satisfy most needs. If the basis metal should be of a radically different nature, a separate calibration is, of course, necessary.

Variations in the thickness of the basis metal are also responsible for certain errors. Brenner[2] has shown that where basis metal thicknesses exceed 0.015 in., thickness variations have little effect on the accuracy of the Magne-Gage. This work has been verified for the present instrument using feeler gauge stock ranging from 0.0015 in. to 0.075 in., and in general, it was concluded that where the basis metal exceeds 0.015 in. in thickness no significant error may be anticipated from this source.

Sensitivity to vibration and shock, though not measured quantitatively, has been found to be quite low. Variation in vertical alignment of the gauge, within reasonable limts, has likewise been found to exert a negligible influence on the reproducibility.

(e) Reproducibility (Uncontrolled Factors):

The reproducibility of the instrument was determined by taking 100 readings at a single spot on the thickness standard (0.00053 in.). The results of this test are shown in Fig. 9. The standard deviation for these scale readings was calculated to be 0.116. This, using the $\pm 3 \times$ the standard deviation, is comparable to ± 4 per cent error for the thickness range.

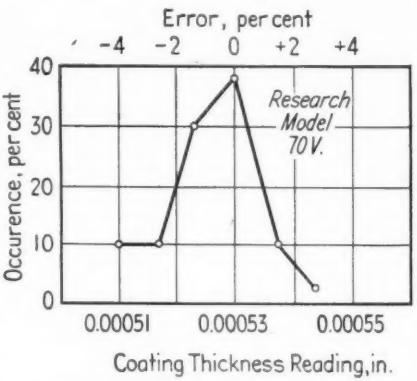


Fig. 9—Reproducibility of Thickness Determinations.

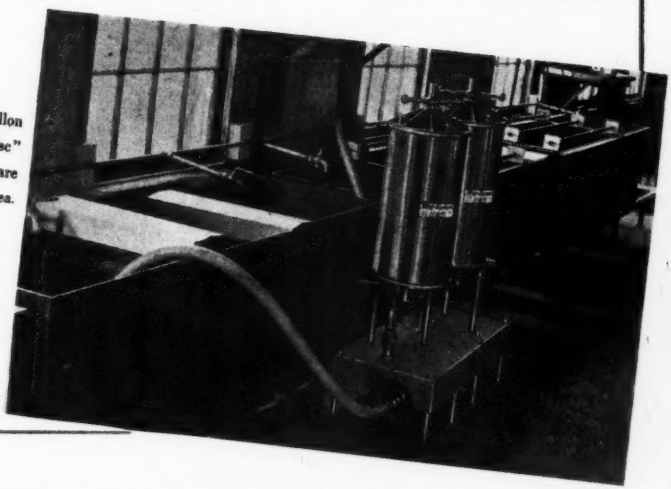
When similar tests were conducted using the service model, the maximum error was approximately ± 5 per cent in the 0.0002-in. range and ± 3 per cent in the 0.002-in.

(*Continued on page* 936)

Good Plating Requires Clean Solutions—

You Get Them With

ALSOP *"Sealed-Disc"* FILTERS



A Portable 3,000 gallon per hour "Sealed-Disc" Filter with 6,000 square inches of filtration area.

LEADING platers are taking advantage of the economies that result from filtering out rust, dirt, sludge and other impurities generally found in plating solutions. Economies come from finer finishes with fewer rejects — in other words, higher production at lower cost. This is especially true when ALSOP "Sealed-Disc" FILTERS are used, because "Sealed Disc" Filters are engineered for high speed and high efficiency.

ALSOP "Sealed-Disc" FILTERS are made in all sizes and for various capacities, with provisions for any desired degree of filtration.

Write today for our bulletin giving complete details on ALSOP filtration equipment. A post card will do.

ALSOP *Engineering Corp.*

35 GRAND STREET

MILLDALE, CONNECTICUT

THE ADHESION OF ELECTRODEPOSITS

I. BIBLIOGRAPHY*

A. E. S. Research Project No. 3

Project Director: A. L. Ferguson
Associate: Elmer F. Stephan
Chemistry Department, University of Michigan
Ann Arbor, Michigan

THE first report on this project appeared in the February, 1945, issue of THE MONTHLY REVIEW. In that report it was indicated that a thorough survey was being made of the published material on this subject, and a brief summary was given of the general nature of the articles and information covered to that date. It might be stated here that the remarks made then hold equally well for all published material uncovered since then. Much assistance has been rendered by members who have sent in copies of bibliographies from their own files. These were carefully checked against our own and some additions were made in this way. Readers are urged to submit any additional references known to them.

Another source which it was felt might produce information of real value is the unpublished experience and private files of the members of the Society and others engaged in electroplating. With this in mind, a circular letter was prepared, copies of which were distributed to every member through the secretaries of the various local sections. In addition, about 150 personal letters have been written to men in the electroplating and related fields requesting contributions from their experiences. An analysis of all information gathered in this manner will be presented in a later report.

Some of the papers in the following bibliography are devoted practically entirely to a study of methods for measuring the adhesion of electrodeposits, some contain rather extensive information on this subject along with other material, but in more papers the subject of adhesion is merely incidental, and the only connection with adhesion may consist in stating the methods used.

The arrangement of the references is according to years and alphabetically for each year. All of the material contained in these references has been thoroughly analyzed and will be presented in organized form in subsequent papers.

1905

1. Burgess, C. F., "Investigation of the Properties of Zinc Coatings." *Electrochemical and Metallurgical Industry*, **3**, 17-22 (1905).

1910

2. Langmuir, Irving, "The Constitution and Fundamental Properties of Solids and Liquids." *J. Am. Chem. Soc.*, **38**, 2221-2295 (1910).

1911

3. McWilliam, Andrew and Barclay, W. R., "The Adhesion of Electrodeposited Silver in Relation to the Nature of the German Silver Basis Metal." *J. Inst. Metals*, **5**, 212-227 (1911).

4. Wen, Ching Yu and Kern, Edward F., "The Effect of Organic and Inorganic 'Addition Agents' upon the Electrodeposition of Copper from Electrolytes Containing Arsenic." *Trans. Electrochem. Soc.*, **20**, 121-177 (1911).

*From Progress Report No. 2.

RELIANCE
VARIABLE SPEED
LATHES

Reliance Variable Speed Lathes Cut Costs
There is a **RELIANCE LATHE** for every need.

Let us quote on your requirements.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS

Plating and Polishing Machinery

Complete Plating Plants Installed

Gen. Office and Factory:

4521 Ogden Ave. **Chicago, Ill.**

Representatives
O. M. Shoe, Philadelphia, Pa.
Wm. R. Shields, Detroit, Mich.
C. B. Little, Newark, N. J.

Branches
LOS ANGELES and
CLEVELAND

"The Copper Strip of Today"

McKeon's "Liquid Sulphur"

TRADE MARK REG'D.

GUARANTEED! Today's copper stripping method. Prove its possibilities. Send samples of your particular job from which you want copper removed. We remove the copper, return it together with directions, showing how your men in your plant can proceed in removing copper plating on your particular requirement. Strip "worry" from your copper stripping job!

WRITE! PHONE! WIRE!

SULPHUR PRODUCTS COMPANY

GREENSBURG, PA.

1915

5. Kalmus, H. T., Harper, C. H. and Savell, W. L., "Electroplating with Cobalt." *Trans. Electrochem. Soc.*, **27**, 75-130 (1915).

1916

5. Baldwin, M. W., "Plating Aluminum." *Monthly Rev. Am. Electroplaters' Soc.*, **3**, 19-20 Oct. (1916).
7. Proctor, C. H., "Alkaline Zinc Solutions and their Application and Commercial Use." *Monthly Rev. Am. Electroplaters' Soc.*, **3**, 12-16 Oct. (1916).

1920

8. MacFadyen, Lt. W. A., "An Aspect of Electrolytic Iron Deposition." *Trans. Faraday Soc.*, **14-15**, 98-133 (1920).

1922

9. Vuilleumier, E. A., "The Application of Contactometer to the Study of Nickel Deposition." *Trans. Electrochem. Soc.*, **42**, 99-112 (1922). — J. D. Alley in discussion on p. 109.

1923

10. Blum W., and Rawdon, H. S., "The Influence of the Base Metal on the Structure of Electrodeposits." *Trans. Electrochem. Soc.*, **44**, 305-312 (1923).
11. Graham, A. K., "Some Relations Between the Micro-Sstructure of Metal Surfaces and Electrodeposits Made Thereon." *Trans. Electrochem. Soc.*, **44**, 427-441 (1923).
12. Hughes, B. A., "Electrodeposition of Iron." *Dept. Sci. Ind. Research* (Brit.), Bull. No. 6, (1923), 50 pages.
13. Search, R. E., "Chromium Plating." *Metal Ind.* (London), **21**, 109-111 (1923).

1925

14. Ollard, E. A., "Adhesion of Deposited Nickel to the Base Metal." *Trans. Faraday Soc.*, **21**, 81-90 (1925).
15. Thomas, C. T., and Blum, William, "The Protective Value of Nickel Plating on Iron and Steel." *Monthly Rev. Am. Electroplaters' Soc.*, **13**, 4-9 Sept. (1925); *Trans. Electrochem. Soc.*, **48**, 69-102 (1925).

1926

16. Ollard, E. A., "Adhesion of Deposited Nickel to Base Metal." *Trans. Faraday Soc.*, **21**, 81-90 (1926).
17. Scott, Willard H., "Chromium Plating." *Monthly Rev. Electroplaters' Soc.*, **13**, 16-19 Oct. (1926).
18. Stacey, H. A., "Bend Tests of Galvanized Sheet Steel." An Abstract of Pamphlet No. 1600-C of 35 pp. *Mining and Met.*, **7**, 451 (1926).

1927

19. Faris, C. H., "The Uses of Nickel Deposits for Engineering Purposes." *Trans. Inst. Eng. Shipbuilders Scot.*, **71**, 209-254 (1927-28).

1928

20. Dorsey, F. M., "The Madsenell Process, Its Products and Their Uses." *Ind. Eng. Chem.*, **20**, 1094-1099 (1928).
21. Work, Harold K., "Electroplating on on Aluminum and its Alloys." *Trans. Electrochem. Soc.*, **53**, 361-387 (1928).

1929

22. Brook, G. B. and Stott, G. H., "Notes on Testing of Electrodeposits on Aluminum." *Metal Ind.*, (London), **34**, 439-441 (1929); *J. Inst. Metals*, **41**, 73-89 (1929).
23. Carson, A. F., "The Sherardizing Process." *Metal Cleaning Finishing*, **1**, 103-104 (1929).
24. Gardam, G. E., "Chromium Plating." *J. Electrodepositores' Tech. Soc.*, **4**, 112-128 (1929).
25. Macnaughtan, D. J. and Hammond R.A.F., "The Progress of Nickel Deposition in Recent Years." *J. Electrodepositors' Tech. Soc.*, **4**, 81-100 (1929).
26. Wernick, S., "The Electrodeposition of Cadmium for Rust Prevention." *J. Electrodepositors' Tech. Soc.*, **4**, 101-112 (1929).

1930

27. Bablik, H., "Bending Conditions of Galvanizing." *Iron Age*, **125**, 1452-1454, (1930).
28. Blum, William and Hogaboom, George B., "Principles of Electroplating and Electroforming." McGraw-Hill Book

Co., New York, 2nd Ed., 1930, pp. 132-134.
29. Brook, G. B. and Stott, G. H., "The Testing of Electrodeposits on Aluminum." *Metal Cleaning Finishing*, **2**, 2, 1031-1032 (1930).
30. Work, Harold K., "Electroplating on Aluminum." *Metal Cleaning Finishing*, **2**, 777-780 (1930).

1931

31. Blum, William, "Adhesion of Electroplated Coatings." *Metals and Alloys*, 1031-1032 (1930).
32. Schuh, A. E., "Evaluating of Industrial Finishes." *Ind. Eng. Chem.*, **23**, 1346-1352 (1931).
33. Stout, Lawrence W., "Silver Cadmium Alloys for Metal Finishing." *Metal Cleaning Finishing*, **3**, 457-460 (1931).
34. Conference on Electroplating Standards, Summary of, Chicago, January 17, 1931. *Monthly Rev. Am. Electroplaters' Soc.*, **18**, 17-22 Apr. (1931).

1932

35. Ballay, Marcel, "Modern Nickel Plating in France." *Trans. Electrochem. Soc.*, **62**, 91-108 (1932).
36. Borgmann, C. W., "Testing of Metallic Coatings." *J. Electrodepositors' Tech. Soc.*, **8**, 4-1 to 4-6 (1932).
37. Hothersall, A. W., "The Adhesion of Electrodeposited Nickel to Brass." *J. Electrodepositors' Tech. Soc.*, **7**, 115-141 (1932).
38. Lamoureux, E., "Better Electroplates by Better Polishing." *Metal Industry* (New York), **30**, 275-277 (1932).
39. Macnaughtan, D. J., "Research and Electrodeposition Practice." *J. Electrodepositors' Tech. Soc.*, **8**, 2-1 to 2-8 (1932).
40. Re, Andrew V., 'Plant Practice for Nickel-Plating Aluminum." *Trans. Electrochem. Soc.* **61**, 337-340 (1932).
41. Vueillenmier, Dr. E. A., "Peeling of Electrodeposited Nickel." *Proc. Am. Electroplaters' Soc.*, **20**, 80-88 (1932).

1933

42. Bannister, L. C., "The Testing of Electrodeposited Coatings." *J. Electrodepositors' Tech. Soc.*, **9-10**, 101-102 (1933).
43. Hothersall, A. W., "The Adhesion of Electrodeposited Coatings to Steel." *Trans. Electrochem. Soc.*, **64**, 69-85 (1933).
44. Laban, N. R., "The Nickel Plating of Zinc Base Die Castings at High Current Densities." *J. Electrodepositors' Tech. Soc.*, **8**, 6-1 to 6-8 (1933).
45. Mears, R. B., "Control Testing of Metallic Coatings." *J. Electrodepositors' Tech. Soc.*, **8**, 6-43 to 6-56 (1933).
46. Overcash, D. M. and Mathers, F. C., "The Electrodeposition of Magnesium." *Trans. Electrochem. Soc.*, **64**, 305-311 (1933).
47. Piersol, R. J., "Measurement of Adhesion in Electroplates." *Metal Cleaning Finishing*, **5**, 503-506; 516-517 (1933).
48. Portevin, A. and Cymbaliste, M., "Emploi du Microscope dans l'etude et le controle des revetements electrolytiques." *Rev. met.*, **30**, 323-348 (1933).
49. Work, Harold K., "Practical Problems in Electroplating on Aluminum." *J. Electrodepositors' Tech. Soc.*, **8**, 7-1 to 7-11 (1933).

1934

50. Altmannsberger, K., "The Mechanics of Adherence in Metal Plating." *Metals and Alloys*, **6**, MA 272 (1934).
51. Fairburn, R. J., "Paint and Lacquer Tests." *Metal Cleaning Finishing*, **6**, 337-344 (1934).
52. Jacquet, Pierre A., "Adhesion of Electrolytic Copper Deposits." *Trans. Electrochem. Soc.*, **66**, 393-426 (1934). — H. Work in discussion.
53. Jacquet, M. P., "Sur une methode de mesure de l'adherence des depots electrolytiques." *Compt. rend.*, **198**, 1313-1315 (1934).
54. Martin, Ray C., "Abrasion and Adhesion Tests for Lacquer Films." *Metal Cleaning Finishing*, **6**, 303-306 (1934).
55. Romanoff, F. P., "Ductility and Adhesion of Nickel Deposits." *Trans. Electrochem. Soc.*, **65**, 385-401 (1934); *Proc. Am. Electroplaters' Soc.*, **22**, 155-166 (1934).

1935

56. Bannister, L. C., "Testing of Electrodeposited Coatings." *Metals and Alloys*, **7**, MA 134 (1935); *Metal Ind.* (London), **46**, 701-704 (1935); *Metal Cleaning Finishing*, **7**, 539-542; 545-546 (1935).

HEATING AND COOLING CONTROLS

Low cost - High accuracy

From high speed copper to chrome, and anodyzing to cleaning and rinsing tanks, Sarco has a complete line of temperature controls. The cost varies according to the problem involved, but for the purposes illustrated the simple, inexpensive Sarco LSI Electric Control will do the trick.

It combines accurate temperature indication with automatic control. It is used extensively for both heating and cooling because it costs less, is more reliable and because of the easy adjustment by thumb screw and the built-in dial thermometer.

This is only one of the many Sarco plating controls which range from the low cost Sarco Thermoton, for approximate control of cleaning and rinse tanks, to the highly accurate TR-21 regulator used on many automatic plating operations.

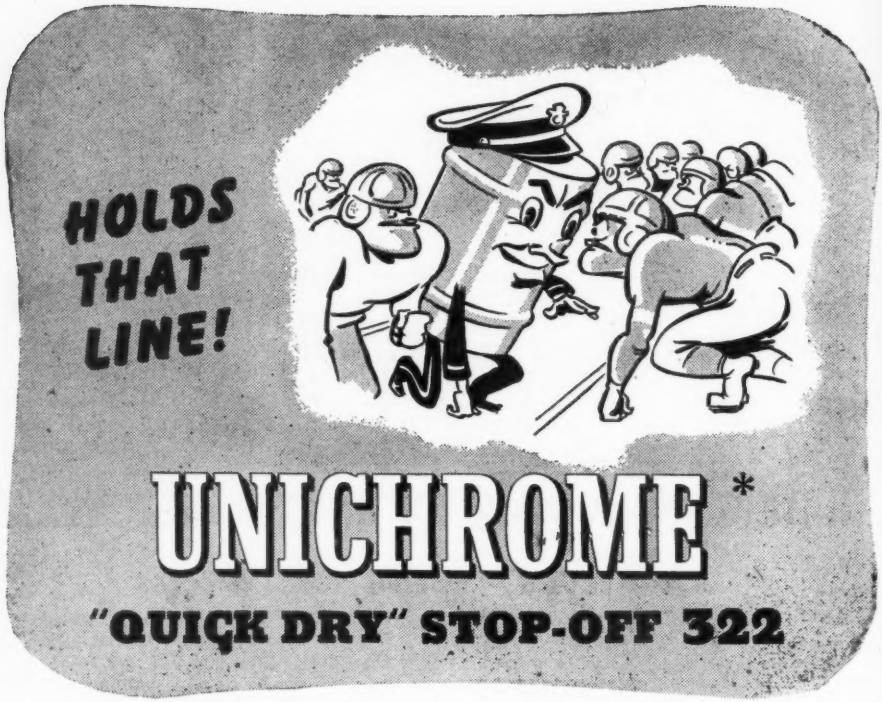
Our representative can show you how others have solved plating problems similar to yours.

49

SARCO COMPANY, INC.
475 FIFTH AVENUE
NEW YORK 17, N. Y.
Represented in Principal Cities

SARCO Saves Steam

SARCO CANADA, LTD., 85 Richmond Street, West, TORONTO, ONTARIO



UNICHROME *

"QUICK DRY" STOP-OFF 322

Makes Your Work Easier, Faster, Better

Tight-holding, clean cutting edges that won't budge a whisker—not even for the toughest plating solutions – that's what Unichrome Stop-Off 322 gives you. This helps you do more accurate work—faster, easier. And besides, Unichrome is most convenient to use. Simply brush, spray or dip. At room temperatures, too. Another thing – it dries fast. Finally, there's no peeling or seepage with Unichrome Stop-Off 322 on the job.

Let us put you down for a trial shipment. See these advantages for yourself. There's a heavy war demand for the new and improved resins in Unichrome Stop-Off 322. But, we'll rush it to you as fast as possible. Write our nearest office for prices and complete data.

*Reg. U.S. Pat. Off.

PROPERTIES

Chemical Resistance – Excellent in all plating cycles.

Application—Can be brushed, sprayed or dipped.

Drying—Dries quickly at room temperature – adheres without force drying.

Stripping – After plating, material may be removed by dissolving in Remover 322 R A.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.

TRY THESE OTHER UNICHROME MATERIALS

Unichrome Quick Dry Stop-Off 323—for chromium and other plating work requiring a stop-off that can be peeled off after use.

Unichrome Air-Dry Rack Coating 203 – a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions.

Unichrome Coating 202 – a new rack insulation similar to Air Dry but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

Unichrome Resist – a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

57. Bauer, Arndt, and Krause, "Chromium Plating." Edward Arnold & Company, (London), 1935.
58. Francis-Carter, C. F. J., "Specifications for Cathodic Coatings." *J. Electrodepositor's Tech. Soc.*, **10**, 69-84 (1935).
59. Monk, R. G. and Ellingham, H. J. T., "Electrodeposition of Tin Alloy from Alkaline Stannate Baths." *Trans. Faraday Soc.*, **31**, 1460-1468 (1935).
60. Romanoff, F. R., "Ductility and Adhesion of Nickel Deposits." *Monthly Rev. Am. Electroplaters' Soc.*, **22**, 8-20 Apr. (1935).
61. Thompson, M. DeKay, "The Adhesion of Electrodeposits." *Metal Cleaning Finishing*, **7**, 83-85 (1935).
62. Wernick, S., "The Specifications of Electrodeposited Coatings." *Ind. Chemist*, **11**, 315-317 (1935).

1936

63. Braund, D. K. and Sutton, H., "Electrodeposition of Zinc and Cadmium on Aluminum and Aluminum Alloys." *J. Electrodepositors' Tech. Soc.* **11**, 57-73 (1936).
64. Clarke, S. G., "The Electrodeposition and Properties of Black Lead Peroxide Coatings." *J. Electrodepositors' Tech. Soc.*, **12**, 26-36 (1936).
65. Finkbone, B. P., "Testing Adherence of Galvanized Coatings." *J. Am. Zinc Inst.*, **17**, 76-80 (1936).
66. Kerr, R. and Macnaughtan, D. J., "The Production of Black Anodic Coatings on Tin and Tin Alloys." *J. Electrodepositors' Tech. Soc.*, **12**, 19-25 (1936).
67. Lyons, Ernest H., "Adhesion of Galvanized Coatings on Steel Wire." *Wire and Wire Products*, **11**, 655-674 (1936).
68. McKay, Robert J., "Technical Properties and Control in Nickel Plating." *Metal Cleaning Finishing*, **8**, 461-468 (1936).
69. Mesle, F. C., "Plating to Specification." *Metal Cleaning Finishing*, **8**, 381-392 (1936).
70. Templin, R. L., "Ductility Testing of Aluminum and Aluminum Alloy Sheet." *Proc. Am. Soc. Testing Materials*, **36**, 239 (1936).
71. Weisberg, Louis, "Use of Cobalt-Nickel Solution to Produce Bright Electrodeposits." *Steel*, **99**, 43-46 (1936).
72. Young, S. B. F. and Gould, N. A., "Nickel and Cobalt Alloy Plating from Acid Sulfate Solution." *Trans. Electrochem. Soc.*, **69**, 585-597 (1936). — Bonilla in discussion on p. 596.

1937

73. Arlt, H. G., "Study of Conical Mandrel Test for Attached Lacquer Films." *A.S.T.M. Bulletin*, Dec., 1937.
74. Ballay, M., "French Nickel Plating Practice." *J. Electrodepositors' Tech. Soc.*, **13**, 4-1 to 4-11 (1937).
75. Bonilla, Chas. F., "Heavy Nickel and Chromium Deposition in England." *Trans. Electrochem. Soc.*, **71**, 263-278 (1937).
76. Corbin, M. R., "Setting up Specifications for Protective Coatings." *Products Finishing*." **1**, 24-28 (1937).
77. Egeberg, B. and Promisel, N. E., "Testing and Stripping of Electrodeposits." *Metal Cleaning Finishing*, **9**, 493-497 (1937).
78. Egeberg, B. and Promisel, N. E., "Testing and Stripping of Electrodeposits." *Metal Cleaning Finishing*, **9**, 25-32, 37-40, 50, 655-662, 731-737 (1937).

1938

79. Brockman, C. J. and Mote, John H., "Alkaline Plating Baths Containing Organic Amines." *Trans. Electrochem. Soc.*, **73**, 371-376 (1938). — E. M. Baker in discussion on p. 374.
80. Egeberg, B. and Promisel, N. E., "Testing and Stripping of Electrodeposits." *Metal Cleaning Finishing*, **10**, 270-274 (1938).
81. Helling, Werner, and Neunzig, Heinrich, "Elyectrolytic Deposition of Copper on Aluminum after Previous Chemical Oxidation." *Aluminium*, **19**, 302, 305 (1937); *Metal Cleaning Finishing*, **10**, 372 (1938).
82. Hirsch, Albert, "Cathode Efficiency of Electroplating Barrels and its Effect on the Adhesion of Nickel Deposits." *Monthly Rev. Am. Electroplaters' Soc.*, **25**, 190-195 (1938).

83. Hothersall, A. W. and Leadbeater, C. J., "The Nickel and Chromium Plating of Tin Plate." *Intern. Tin Research Development Council, Tech. Pub. A*, **79**, 207-228 (1938); *J. Electrodepositors' Tech. Soc.*, **14**, 207-228 (1938).
84. Hothersall, A. W. and Gardam, G. E., "The Value of an Alternate Bend Test in the Examination of Nickel Deposits." *J. Electrodepositors' Tech. Soc.*, **14**, 73-84 (1938).
85. Martin, Ray C., "Testing of Modern Finishes." *Products Finishing*, **2**, 7-13 (1938).
86. Mathers, F. C. and Gilbertson, L. I., "The Adherence of Thick Silver Plate on Steel." *Trans. Electrochem. Soc.*, **74**, 287-304 (1938).
87. Special Committee of Section on Bend Tests for Ductility, "Report on Study of Cup Testing of Sheet Steel." *Proc. Am. Soc. Testing Materials*, **38**, 490 (1938).
88. Wernick, S., "Bright Nickel Plating of Zinc Base Die Castings." *J. Electrodepositors' Tech. Soc.*, **14**, 154-162 (1938).
89. Wheeler, Robert B., "Testing Machines for Organic Finishes." *Products Finishing*, **2**, 14-22 (1938).
90. Wood, Donald A., "A Simple Method of Plating Nickel on Stainless Steel." *Metal Ind.* (New York), **36**, 330-331, (1938).

1939

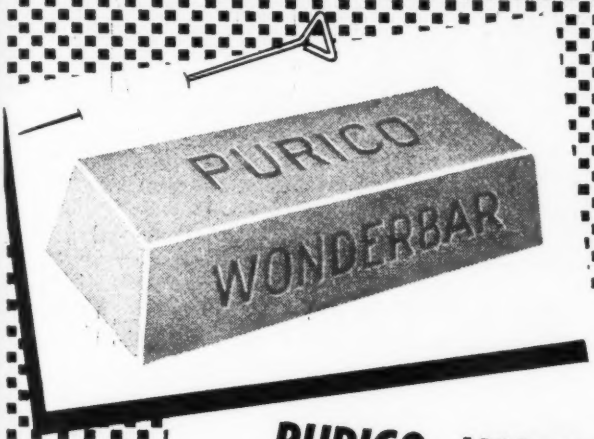
91. Ballay, M., "Electrolytic Deposits in France." *Proc. Am. Electroplaters' Soc.*, **27**, 30-36 (1939).
92. Burns, R. M. and Schuh, A. E., Protective Coatings for Metals." Reinhold Publishing Corp., New York, 1939, pp. 82-83, 238.
93. Gardner, H. A., "Physical and Chemical Examination, Paints, Varnishes, Lacquers, Colors." *Inst. of Paint and Varnish Research*, Washington, D.C., 9th ed., 1939.
94. Hothersall, A. W., "Notes on the Adhesion of Electrodeposited Metal to Steel." *Proc. Am. Electroplaters' Soc.*, **27**, 1-8 (1939).
95. Hothersall, A. W., "A Suggested Basis for Specifications of Electroplated Coatings of Nickel and Chromium." *J. Electrodepositors' Tech. Soc.* **15**, 195-204 (1939).
96. Mesle, Frank C., "The Adhesion of Electrodeposits." *Proc. Am. Electroplaters' Soc.*, **27**, 152-170 (1939).
97. West, E. G., "Barrel Polishing." *J. Electrodepositors' Tech. Soc.*, **15**, 185-194 (1939).
98. Yates, Raymond, "Electroplating on Aluminum." *Products Finishing*, **3**, 40-46 (1939).

1940

99. Ewing, Dwight T. and Jernstedt, Geo. W., "The Cathodic Treatment of Copper in a Solution of Beryllium Sulfate to Prevent Tarnishing." *Proc. Am. Electroplaters' Soc.*, **28**, 105-112 (1940).
100. Glasstone, S., "Textbook of Physical Chemistry." D. Van Nostrand Co., New York, 1940, p. 1179.
101. Imhoff, Wallace G., "How Durable Are Hot-Dip Zinc Coatings?" *Products Finishing*, **4**, 24-36 (1940).
102. *L'Association Francaise de Normalisation Specification*, A4-2, 1940.
103. Lewis, B. F., "The Relationship of Cleaning Techniques and Adhesion of Electrodeposits." *Proc. Am. Electroplaters' Soc.*, **28**, 64-70 (1940).
104. Mesle, F. C., "The Adhesion of Electrodeposits." *Metals and Alloys*, **11**, MA 262 (1940).
105. Oplinger, F. F., "The Plating and Heating of Zinc Base Die Castings." *Proc. Am. Electroplaters' Soc.*, **28**, 70-81 (1940).
106. *Products Finishing* (Editorial Supplement), **4**, 51 (1940).
107. Roehl, E. J., "Adhesion of Nickel Deposits." *Iron Age*, **146**, 17-20, 30-33 (1940).
108. Simon, A. C. and Lumley, J. T., "Silver Plating at Very High Current Densities." *Proc. Am. Electroplaters' Soc.*, **28**, 91-95 (1940).
109. Wernick, S., "Factors in the Production of Perfect Nickel Plating." *J. Electrodepositors' Tech. Soc.*, **16**, 35-44 (1940).

1941

110. Lyons, Ernest H., "Acid Zinc Plating." *Trans. Electrochem. Soc.*, **80**,



PURICO WONDERBAR

The Original Pre-Saponified Compound

"Pre-saponification" was introduced by PURITAN MANUFACTURING COMPANY many years ago as the ideal means of securing a finer texture, more readily dissolvable compound for cleaning and buffing. Many manufacturers have attempted to copy this patented process but today as before the PURICO WONDERBAR is unexcelled for cleaning and buffing intricate recesses, patterned or perforated silver, brass, and nickle products—it is still considered by many as the only way to . . .

Start with a Good Finish

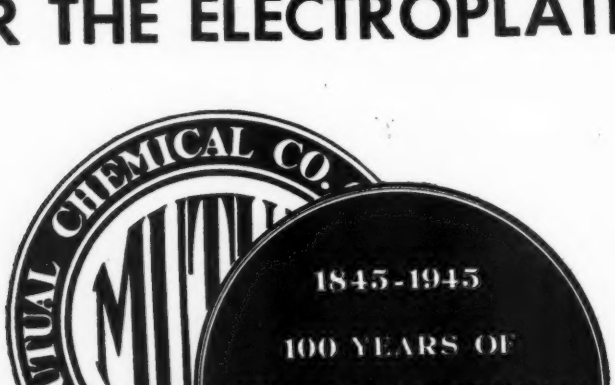
THE *Puritan*
MANUFACTURING COMPANY
WATERBURY, CONNECTICUT

NATIONAL DISTRIBUTORS

SESSIONS-GIFFORD CO. Providence
W. D. FORBES Minneapolis
L. H. BUTCHER CO. Los Angeles
JACOB HAY COMPANY Chicago

CHROMIUM CHEMICALS

FOR THE ELECTROPLATER



- BICHROMATE OF POTASH
- BICHROMATE OF SODA
- CHROMIC ACID

MUTUAL CHEMICAL COMPANY OF AMERICA

270 MADISON AVENUE NEW YORK 16, N.Y.

387-405 (1941); "Modern Electroplating." The Electrochemical Society, New York, 1942, pp. 343-358.

111. Meyer, Walter R., "Effects of Impurities in Plating Solutions." *Proc. Electroplaters' Soc.*, **29**, 65-88 (1941).

112. Pinner, W. L.; Soderberg, G. and Baker, E. M., "Nickel Plating." *Trans. Electrochem. Soc.*, **80**, 539-578 (1941); "Modern Electroplating," The Electrochemical Society, New York, 1942, pp. 235-274.

113. Roehl, E. J., "Adhesion of Nickel Deposits." *Metal Finishing*, **39**, 182-187 (1941).

114. Faust, Chas. L., *Trans. Electrochem. Soc.*, 80, 275-276 (1941); "Modern Electroplating," The Electrochemical Society, New York, 1942, pp. 271-272.

1942

115. Blum, W.; Beckman, W. O. and Meyer, W. R., *Trans. Electrochem. Soc.*, **80**, 282-283 (1941); "Modern Electroplating," The Electrochemical Society, New York, 1942, pp. 40-41.

116. Crosby, H. Lance, and Gilbertson, L. I., "The Adherence of Thick Silver Plate on Steel, Part II." *Trans. Electrochem. Soc.*, **82**, 101-111 (1942). — Mullins in discussion on p. 110.

117. Krause, Hugo, "Heavy Electrodeposited Coatings of Silver in the Chemical Industry." *Chemical Abstracts*, **36**, 5710 (1942).

118. Loose, W. S., "Nickel Plating Magnesium Alloys." *Trans. Electrochem. Soc.*, **81**, 215-230 (1942).

119. Lo Presti, P. J., "Silver Plating Steel over a Phosphate Coating." *Metal Finishing*, **40**, 533-536 (1942).

120. Pell-Walpole, W. T.; Prytherch, J. C. and Chalmers, B., "An Investigation of the Factors Governing the Adhesion of Tin-base Bearing Metal." *J. Inst. Metals*, **68**, 217-256 (1942).

121. Wesley, W. A. and Roehl, W. J., "The Deposition of Hard Nickel." *Products Finishing*, **7**, 10-32 (1942); *Trans. Electrochem. Soc.*, **82**, 37-53 (1942).

122. Wilson, R. E., "The Employment of Electrochemical Deposition in the Manufacturing and Maintenance of Automobiles." *Proc. Inst. Automobile Eng.*, **36**, 211-233 (1941-42).

123. Yates, Raymond, "Plating on Aluminum." *Metals and Alloys*, **16**, 1084-1088 (1942).

1943

124. Ap Roberts, James P., "Problems and Methods for Plating on Magnesium." *Monthly Rev. Am. Electroplaters' Soc.*, **30**, 275-283 (1943).

125. Army Service Forces, Office Chief of Ordnance, Washington 25, D. C., "Adhesion Test." *U. S. Army Specification* No. 57-0-2, Paragraph F-7, 1943.

126. Hiller, Robert, "A Discussion of Methods for Control Analysis of Electrodeposited Coatings Used on Aircraft Parts." *Monthly Rev. Am. Electroplaters' Soc.*, **30**, 786-796 (1943).

127. Lo Presti, Phillip J., "Corrosion Resistance of Silver Plated Steel." *Trans. Electrochem. Soc.*, **84**, 335-346 (1943).

128. Yates, Raymond, "Plating Aluminum." *Monthly Rev. Am. Electroplaters' Soc.*, **30**, 173 (1943).

1944

129. Clark, Geo. L., Fisk, Geo., Weeg, Leonuard B., "Bonding and Structural Variations of Commercial Electroplatings." *J. Applied Phys.*, **15**, 193-200 (1944).

130. Hothersall, A. W. and Leadbeater, C. J., "Inspection Tests for the Adhesion of Electroplated Coatings with Particular Reference to the B.N.F. Adhesion Test." *J. Electrodepositors' Tech. Soc.*, **19**, 49-62, (1944); *Metal Finishing*, **43**, 191-194, 245-246 (1945).

131. Wernick, S., "Secretary's Report to Annual General Meeting of The Electrodepositors' Technical Society." *Metal Ind.* (London), **54**, 861 (1944).

1945

132. *British Standard Specifications*, No. 1224, 1945.

133. "The Handkerchief Test." *Iron Age*, **155**, 26 (1945).

134. Lewis, B. F., "Adhesion of Electrodeposits." *Monthly Rev. Am. Electroplaters' Soc.*, **32**, 139-147 (1945).

CORRECTION

For "Progress Report Number 2 A.E.S. Research Project No. 1"

The table near the top of the second column of page 678 of the July, 1945 issue should read:

Bath Composition	Optimum	Limits
Copper cyanide	6 oz./gal.	5-8 oz./gal.
Sodium cyanide	8.6 oz./gal.	8.1-9.1 oz./gal.
Free sodium cyanide	2.0 oz./gal.	1.5-2.5 oz./gal.
Trisodium phosphate	8 oz./gal.	6-10 oz./gal.
Caustic soda to give pH of	12.2 (elec.)	12.0-12.3 (elec.)

32nd. PROCEEDINGS

A. E. S. announces publication of the 32nd Annual PROCEEDINGS published in book form 6½ x 9¼ bound in attractive cloth cover, 279 pages.

Contains all papers presented at the technical sessions of the 32nd Annual Convention.

A partial list of papers includes, Porous Chromium Plating Principles, Procedures and Operating Practices, Plastics and Plating on Plastics. A Rapid Determination of Copper in Nickel Plating Baths, Hard Chrome Problems, Electroforming Techniques, Bright Alloy Plating, Anodizing Aluminum, etc.

Price $5.00 prepaid

THE AMERICAN ELECTROPLATERS SOCIETY
Jenkintown, Pa.
P.O. Box 168

1946 AES PROCEEDINGS

(*Continued from page* 879)

4. All material obtained in this way, including the original papers, questions, answers and other discussion, will be edited and incorporated into a 1946 Proceedings.

5. It will be necessary that all papers be received by R. A. Dimon, 210 Semple Street, Pittsburgh, Pennsylvania, or Frank Savage, C. G. Conn Ltd., Elkhart, Indiana, not later than the end of April 1946.

6. All papers will be surveyed by the paper awards committee and will be eligible for awards whether a convention is held or not. Branch papers will be accepted and judged for awards.

There is every indication that the year 1946 will be one of reconversion. Let us place the members of our Society in a position to meet the problems which will confront them by making available in this 1946 volume some of the very worthwhile developments which have taken place during the war period.

Planning the Proceedings is a job that requires cooperation and individuals who expect to have material suitable for a paper can help by promptly notifying one of the men mentioned above. All branch officers too are strongly urged to cooperate in making the 1946 Proceedings a reality and a success by helping obtain suitable papers and forwarding the names of all prospective authors and titles of their papers to either R. A. Dimon or Frank Savage.

FRANK K. SAVAGE
Educational Chairman

Sustaining Membership List

Due to delays in preparation, this list, scheduled for publication in September, will appear in a forthcoming issue of Monthly Review.

A CAT WITH 9 LIVES HAS NOTHING ON DIVERSEY D C - 2 2

THIS HEAVY DUTY CLEANER FOR IRON AND STEEL HAS *Reserve Power*

When it comes to long-life, the legendary cat with 9 lives has nothing on DC-22. This heavy duty cleaner for iron and steel has unusual reserve power . . . maintains peak cleaning strength even with large amounts of contamination in the solution. More economical . . . because pound for pound you get more work through with DC-22.

A vigorous, heavy duty cleaner, Diversey DC-22 quickly and completely removes all types of solid dirt, oil and grease from iron and steel prior to electrocleaning or electroplating. Unusual cleaning action is made possible by superior saponifying, emulsifying, wetting and penetrating power. A dry product, completely soluble in water, DC-22 readily provides a solution of the required strength for tank cleaning.

For liberal experimental sample write Metal Industries Department

THE DIVERSEY CORPORATION

53 West Jackson Blvd., Chicago 4, Ill.

HELP WANTED? JUST CALL A DIVERSEY D-MAN

FOLLOW LEA

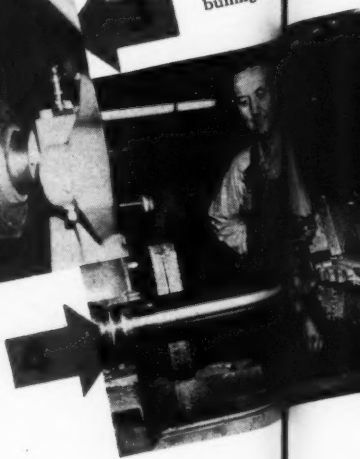
through a

Halfway through the first cut, removing approximately 7/10 of one one-thousandth of an inch.

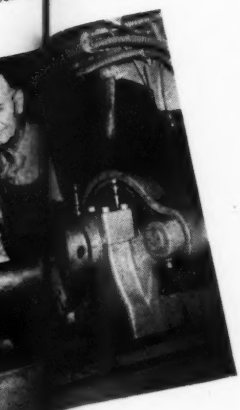
Main Landing Gear Pist... for polishing before pla... mounted on engine lat... with buffing motor o... Grade L Lea Compou... the muslin wheel si... Lea-Sive.

Polishing completed; tolerance held to 5/10 of one one-thousandth of an inch; Grade S Lea Compound is used on muslin wheel sized with Ad-Lea-Sive.

Completing ... cut; buffing op...



a 3-minute close tolerance finishing operation at MENASCO



THROUGH the courtesy of Menasco Manufacturing Company of Burbank, California, we are permitted to show these sequence pictures of a typical LEA Finishing Operation. They are among the best we have ever seen. And they tell the story of LEA Service to industry . . . a service helping to devise better and more economical finishing methods . . . a service supplying the proper grades of Lea Compound, industry's greaseless composition or of Learok, the "no-free-grease" composition.

Intelligent and experienced help in turning out properly finished articles — metals or non-metals—this is what you get when you bring your finishing problem to LEA.

THE LEA MANUFACTURING CO.
Waterbury 86, Connecticut
Burring, Buffing and Polishing . . . Manufacturers and Specialists in the Development of Production Methods and Compositions

THE NEW APPROACH TO ZINC PLATING

The Attention of zinc platers focuses today on General Chemical Zinc Fluoborate Solution, for this new electroplating chemical holds promise of being far superior to other baths for many strip and tank applications.

For continuous plating of wire, cable, strip or sheet, Zinc Fluoborate is the "chemical of tomorrow." It demonstrates properties of high conductivity, high current density and ease of control so necessary to efficient and economical strip plating operations.

In addition, Zinc Fluoborate is proving particularly adaptable to tank or barrel plating of malleable and cast iron castings, since it gives excellent adherence and uniform coverage together with a lustrous finish.

General Chemical Fluorine Division has prepared operating data sheets on Zinc Fluoborate, which are of interest to every zinc plater. For copies of this useful material and for full information on experimental and commercial quantities of Zinc Fluoborate, contact the nearest General Chemical Sales and Technical Service Office below or write General Chemical Company, Fluorine Division, 40 Rector Street, New York 6, N. Y.

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima

In Wisconsin: General Chemical Wisconsin Corp., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited
Montreal • Toronto • Vancouver

Speakers for Branch Educational Activities

The following is a partial list of speakers who are available for Branch meetings, the subject matter which they are prepared to cover, and the areas in which they are available. To obtain a maximum of educational activities for the various Branches it is earnestly requested that additional companies which can supply speakers or individuals with appropriate subjects contact Mr. Frank K. Savage, Educational Chairman, c/o C. G. Conn Co., Ltd., Elkhart, Ind.

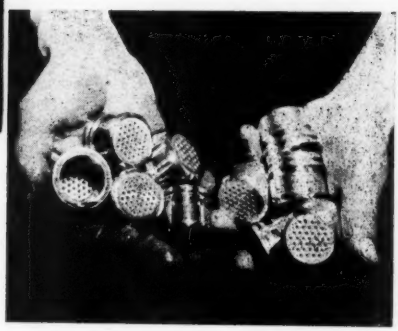
(b) Expenses paid by Branch. **(c) Expenses paid by Company.**

Name and Address	*Subject*	*Area*
Dr. A. L. Ferguson (b) University of Michigan Department of Chemistry Ann Arbor, Mich.	Polarization and Overvoltage	Middlewest
B. F. Lewis (c) Northwest Chemical Co. 9310 Roselawn Ave. Detroit 4, Mich.	Metal Cleaning and Adhesion	Middlewest
Roxalin Flexible Finishes, Inc. (c) Elizabeth, N. J. (Speaker depending on subject desired. Contact Mr. E. D. Horgan, Vice President.)	To be selected	East and Middlewest
N. Ransohoff, Inc. (c) Township Ave. and Big Four R. R. Elmwood Place Cincinnati 16, Ohio (Mr. Frank T. Mann or others depending on subject and location.)	Burnishing before and after Plating Cleaning before Plating, Rinsing and Drying after Plating	East and Middlewest
George Hogaboom (b) 557 Stanley St. New Britain, Conn.	Subject selected by Branch if sufficient data is available	Any Branch
Parker Rust-Proof Co. (c) 2177 E. Milwaukee Ave. Detroit 11, Mich.:		
S. J. Colvin 60 E. 42nd St. New York 17, N. Y.	Rust-Proofing	East
M. B. Roosa 2177 E. Milwaukee Ave. Detroit 11, Mich.	Rust-Proofing	Middlewest

Name and Address	Subject	Area
Oakite Products, Inc. (c) 22 Thames St. New York 6, N. Y. (Contact Mr. John A. Carter, Assistant to the President. Speaker depending upon locality.)	Metal Cleaning and Allied Operations	Any Branch
Oivine Brothers Co. (c) 200 Seward Ave. Utica 1, N. Y.:		
H. J. Breithart 3 Woodside Park Pleasant Ridge, Mich.	Metal Finishing	Middlewest
A. M. Brown 1209 Kemble St. Utica 3, N. Y.	Metal Finishing	Surrounding Area
G. A. Callanen, Jr. 123 Sanger Ave. Waterville, N. Y.	Metal Finishing	Surrounding Area
C. S. Johnson 74 Haverford St. Hamden, Conn.	Metal Finishing	New England
R. L. Klaas 101 Overlook Rd. Upper Montclair, N. J.	Metal Finishing	East
T. L. Padgham 10 Melrose Ave. Utica, N. Y.	Metal Finishing	New England and Upper New York State
William Peterson 320 E. German St. Herkimer, N. Y.	Metal Finishing	East
L. E. Sullivan 62 Gould Place Caldwell, N. J.	Metal Finishing	East
F. H. Thompson 1525 Salem Ave. Dayton, Ohio	Metal Finishing	Middlewest
J. Warren 88 Maplewood Ave. West Hartford, Conn.	Metal Finishing	New England
L. W. Reinken (c) Chief Engineer W. Green Electric Co. Green Exchange Building 130 Cedar St. New York 6, N. Y.	Rectifiers	New York City and Surrounding Area

"BETTER OUTPUT... THOROUGH CLEANING"

Magnus Aja-Dip Cleaning Machine
(Patented)



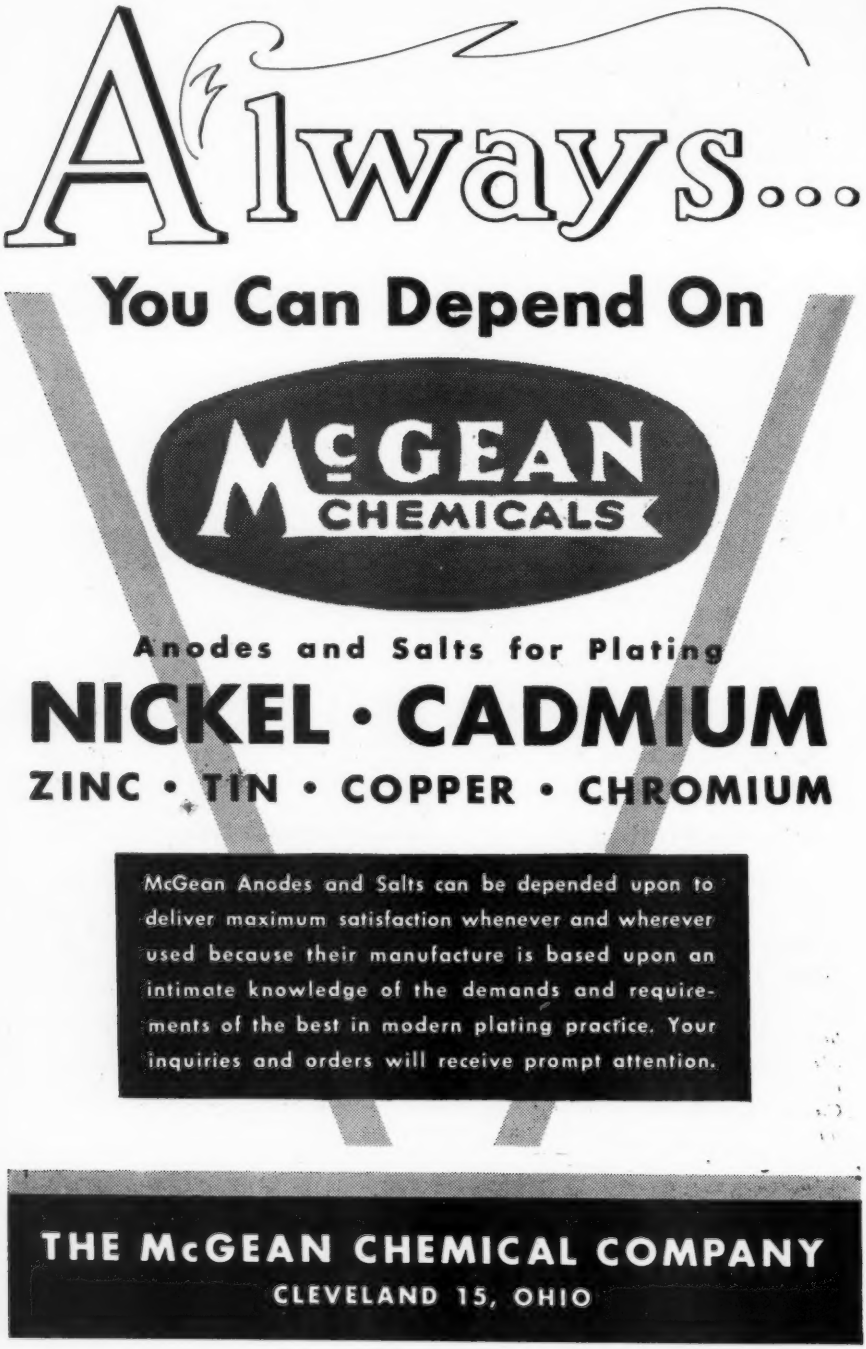
Used on Brass, Bronze, Aluminum and Stainless Screw Machine Parts Prior to Plating

Want Faster, Better Cleaning?

Let us show you how the Aja-Dip Machine and the right Magnus Cleaner will do the job.

This producer of airplane accessories is using the Magnus Aja-Dip Cleaning Machine with Magnus 92XX for cleaning mixed screw machine parts of bronze, brass, aluminum and stainless steel of chips and other solid dirts, as well as cutting oils. They are getting chemically clean work ready for efficient electroplating without etching or tarnishing action by the cleaner on the non-ferrous metals. They report a 10% overall saving over previous methods in time, handling and labor costs.

MAGNUS CHEMICAL COMPANY
41 SOUTH AVE GARWOOD N J
MAGNUS Cleaners • Machines


Always...
You Can Depend On
McGEAN
CHEMICALS
Anodes and Salts for Plating
NICKEL • CADMIUM
ZINC • TIN • COPPER • CHROMIUM
McGean Anodes and Salts can be depended upon to deliver maximum satisfaction whenever and wherever used because their manufacture is based upon an intimate knowledge of the demands and requirements of the best in modern plating practice. Your inquiries and orders will receive prompt attention.
THE McGEAN CHEMICAL COMPANY
CLEVELAND 15, OHIO

Name and Address	Subject	Area
J. W. Dammers (c) G. S. Blakeslee & Co. 19th St. and 52nd Ave. Chicago 50, Ill.	Degreasing Metal Washing	Any Branch
Dr. F. C. Mathers (b) Department of Chemistry Indiana University Bloomington, Ind.	Addition Agents and Some Theories Concerning Addition Agents Rarer Elements and Some of Their Uses Lead Plating from Baths Not Yet Commercially Developed	Any Branch
Industrial Filter & Pump Mfg. Co. (c) 1621-25 W. Carroll Ave. Chicago 12, Ill. (Contact Mr. Thomas Lundberg. Speaker depending on locality.)	Filtration of Plating Solutions. Demonstration of a Test Filter Unit under Glass	East and Middlewest
Lionel de Waltoff (c) Technical Director Fidelity Chemical Products Corp. 430 Riverside Ave. Newark, N. J.	Metal Cleaning Metal Stripping	East
William M. Phillips (c) Electrochemistry Dept. Research Laboratories Div. General Motors Corp. Detroit, Mich.	To be selected	Middlewest
Detrex Corporation (c) Detroit 27, Mich.:		
W. F. Newberry	Vapor Degreasing General Industrial Cleaning	Middlewest
C. W. Smith	Laboratory Control of Alkalies and Emulsions Metal Processing	Middlewest
T. J. Kearney	Solvents Degreasing Engineering Concerning Degreasers	Middlewest
S. B. Crooks	Vapor Degreasing	Far West
L. Camel	Metal Processing as It Affects the Cleaning Industry Alkali and Emulsion Cleaning	Middlewest

Name and Address	Subject	Area
S. A. Harris	Solvents Degreasing General Industrial Cleaning	East
E. N. Taylor	Solvent Degreasing General Industrial Cleaning	Middlewest
Frank K. Rouge (c) The Electric Products Co. Clarkstone Rd. Cleveland 12, Ohio	Motor Generator Sets and Rectifiers for Electroplating	East and Middlewest
W. H. Helbig (c) Chemical Engineer Darco Corporation 60 E. 42nd St. New York 17, N. Y.	Purification of Plating Solutions by Filtration and Activated Carbon Treatment. Talk includes Filter Demonstration	East and Middlewest
Dr. Walter Meyer (c) Technical Director The Enthone Co. New Haven 2, Conn.	Structure of Electroplated Coatings Plating on Aluminum Coloring of Metals Plating Cycles	East and Middlewest
Hanson-Van Winkle-Munning Co. Matawan, N. J.:		
Myron B. Diggin	Plating and electrochemical subjects. Titles to be arranged.	East and Middlewest
Everett E. Carlson	Plating and electrochemical subjects. Titles to be arranged.	East
Paul J. Lalonde	Plating and electrochemical subjects. Titles to be arranged.	East
Allen T. Baldwin	Hot Galvanizing Hot Tinning	East and Middlewest
Joseph S. Brady	Cleaners and Cleaning Problems	East and Middlewest
Raymond F. Ledford Hanson-Van Winkle-Munning Co. 2920 Carroll Ave. Chicago 12, Ill.	Plating and electrochemical subjects. Titles to be arranged.	East and Middlewest
Bernard C. Case Hanson-Van Winkle-Munning Co. 2842 W. Grand Blvd. Curtis Bldg. Detroit 2, Mich.	Plating and electrochemical subjects. Titles to be arranged.	Middlewest
Wilfred S. McKeon (c) Sulphur Products Co. Greensburg, Pa.	Stripping Copper Plate	Any Branch

TESTS PROVE the superiority of

PENNSALT CLEANER EC-10

U. S. PAT. NO. 2374113

..A New Emulsion-Type Cleaner

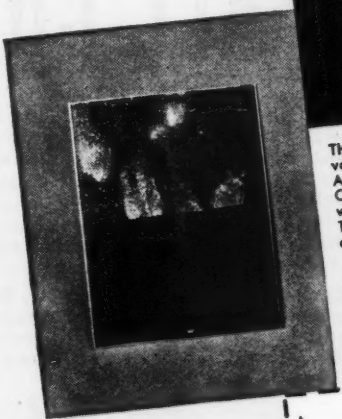
A *SINGLE OPERATION* QUICKLY FREES METAL PARTS OF DIRT, OILS, GREASES, METAL CHIPS

Embodying a new principle, Pennsalt Cleaner EC-10 actually removes some types of soil which alkaline cleaners won't budge in the short time today's stepped-up production demands. Smut deposits, together with lubricants, tripoli, rouge and various metal finishing agents many times require lengthy, time-consuming cleaning operations.

Use Pennsalt Cleaner EC-10 for:

1. **Spray washing and rust inhibiting in one operation**
2. **Precleaning before alkaline cleaning and subsequent plating**
3. **Cleaning before painting**
4. **Cleaning painted surfaces**
5. **Grease and oil removal from any metal surface**

These graduates show comparison of three solvent emulsion cleaners, diluted 1:50 with water. After standing forty-eight hours No. 1 (Pennsalt Cleaner EC-10) shows a thick dense emulsion, while No. 2 and No. 3 show considerable separation. This test demonstrates the high degree of stability of Pennsalt Cleaner EC-10 in water emulsion.



A strip of polished aluminum contaminated with shop dirt and fingerprints was dipped in a solution of Pennsalt Cleaner EC-10. The picture shows the result after a portion of the strip had been dipped in concentrated EC-10 for thirty seconds, then cold water rinsed.

SPECIAL CHEMICALS DIVISION PRODUCTS

Acid-, Alkali-, and Solvent-proof Cements • Lead Fluoborate Concentrates • Fluoboric Acid • Acid, Alkali and Solvent Emulsion-Type Cleaners • Paint Strippers • Pickling Agents.

Send for FREE booklet

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. MR9, 1000 Widener Building,
Philadelphia 7, Pa.

Kindly send me descriptive booklet on Pennsalt Cleaner EC-10.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

SPECIAL CHEMICALS DIVISION

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Cincinnati • Minneapolis • Wyandotte • Tacoma

TAKING ON ALL COMERS

Whether the job is heavy or light, there's a Wyandotte Metal Cleaner ready to take a quick and effective punch at it. This specialization makes the Wyandotte line particularly valuable nowadays when you can't afford to lose time and materials with cleaners that do less than first-rate work.

The Wyandotte Field Engineer is a specialist, too—and always at your service. He has a metal cleaner to meet any need—for cleaning after machining and prior to plating, painting, lacquering, blackening, anodizing or spot-welding operations.

He may be able to help you even in the case of a new process. For he's backed by Wyandotte research and extensive experience with all kinds of metal cleaning problems.

Don't hesitate to consult the Wyandotte Representative at any time—on any cleaning problem. He'll be glad to be of assistance to you.

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • J. B. Ford Division • Wyandotte, Michigan

SERVICE REPRESENTATIVES IN 88 CITIES

Name and Address	Subject	Area
W. L. Hensley (c) Technical Director Zapon Division Atlas Powder Co. North Chicago, Ill.	Manufacture and Testing of Industrial Finishes. Twenty-minute colored motion picture. Display of specimens of various finishes.	Middlewest
Lea Manufacturing Co. (c) 16 Cherry Ave. Waterbury 86, Conn.:		
Richard P. Crane	Polishing Developments	East and Middlewest
Henry L. Kellner	Flexible Polishing	East and Middlewest
General Electric Co. (c) 1285 Boston Ave. Bridgeport 2, Conn. (Contact Mr. I. A. Lee. Speaker to be arranged.)	Rectifiers for Electroplating	Any Branch
E. I. du Pont de Nemours & Co. (c) Electroplating Division Wilmington, Dela. (Contact F. F. Oplinger, Assistant Manager, for following speakers:)		
L. J. Schustic	Zinc and Copper Plating	Chicago, Rockford, Milwaukee
H. L. Benner	Zinc and Copper Plating	Detroit
E. C. Friedl	Zinc and Copper Plating	Cleveland, Pittsburgh, Toledo
H. W. Kennedy	Zinc and Copper Plating	Dayton, Cincinnati, St. Louis
R. H. McCahan	Zinc and Copper Plating	New England
D. W. Hill	Zinc and Copper Plating	Buffalo, Rochester
W. J. Schneider	Zinc and Copper Plating	New York, Philadelphia, Baltimore, Washington
R. R. Bair	Zinc and Copper Plating	To be arranged
Sparkler Mfg. Co. (c) Mundelein, Ill.:		
A. C. Kracklauer	Filtering of Electroplating Solutions	Any Branch
William J. Kracklauer	Filtering of Electroplating Solutions	Any Branch
MacDermid Incorporated Waterbury 88, Conn.:		
Henry Strow	Metal Finishing	East
W. L. Cassell	Plating Equipment	East
G. S. Krentel 1355 W. Elmdale Chicago 40, Ill.	Cleaning Cycles Metal Preparations	Middlewest and South

Name and Address	Subject	Area
United Chromium, Inc. (c) 2751 E. Jefferson Ave. Detroit 7, Mich.:		
T. G. Coyle 51 E. 42nd St. New York 17, N. Y.	Porous Chromium	East and Middlewest
H. Mahlstedt 51 E. 42nd St. New York 17, N. Y.	Porous Chromium Anozinc Protective Dips for Zinc and Cadmium Use of Rack Coatings and Stop-off Materials in Plating Department Copper Plating from Pyrophosphate Copper Solutions Electrocolor	East
M. Schacat United Chromium, Inc. Waterbury 90, Conn.	Porous Chromium Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Electrocolor	East
W. S. Cibulskis 2751 E. Jefferson Ave. Detroit 7, Mich.	Porous Chromium	East
J. Guffie 51 E. 42nd St. New York 17, N. Y.	Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Copper Plating, etc. Electrocolor	East
F. Fulforth United Chromium, Inc. Waterbury 90, Conn.	Use of Rack Coating, etc.	East
E. N. Riotte 51 E. 42nd St. New York 17, N. Y.	Protective Dips, etc.	East
C. Dubpernell United Chromium, Inc. Waterbury 90, Conn.	Plating Literature	East
R. H. Dudley 2751 E. Jefferson Ave. Detroit 7, Mich.	Porous Chromium Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Copper Plating, etc.	Middlewest
L. A. Critchfield 845 N. Main St. Dayton 5, Ohio	Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Copper Plating, etc.	Middlewest

Is there a new discovery that bans rust from steel?

YES, THERE *is* such a discovery. It is CORRONIZING, a phenomenal new alloy "armor" for steel that may soon bring you washing machines, automobiles, water heaters, tools, dozens of steel products with up to *4 times longer life* than any you've ever owned!

The reason? CORRONIZING can defy every possible source of corrosion and far *outlast other rust-protective coatings.* This has been proved by hundreds of scientific tests and actual use in the war, in every kind of climate.

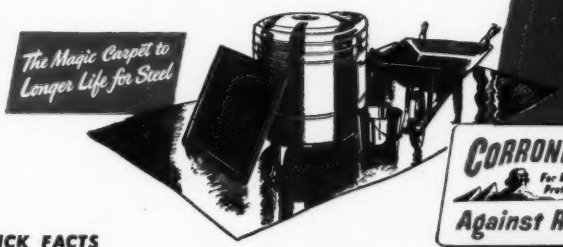
Soon America's more progressive manufacturers and retailers will be able to bring you products with the sensational advantages of "Corronized" steel. Motor car makers—always in the forefront of progress—may be among the first to bring you CORRONIZING, in the new model cars.

Thanks to CORRONIZING, you will be able to get up to *4 times the service for your money* in the wonderful new products made of steel!

Standard Steel Spring Co.

ORIGINATORS OF

CORRONIZING



QUICK FACTS

CORRONIZING provides a permanent alloy "armor" with 5 layers of defense against corrosion! It becomes part of the steel base . . . can be worked in any manner. Permits using lighter materials by prolonging steel's period of greatest strength. Write for samples and complete information.

STANDARD STEEL SPRING COMPANY
CORAOPOLIS, PENNSYLVANIA

Having Trouble Removing the Paint?

USE FIDELITY

Stripping Compounds

If you've been using ordinary strippers, your workers too may have been tempted to pick up hammer and chisel and take a whack at those paint spots that won't come off.

To speed up stripping operations in your plant, give your men materials they can depend upon to do the job thoroughly. Call in a Fidelity service engineer and let him recommend the right compounds for your requirements.

FIDELITY CHEMICAL PRODUCTS CORP.

430 RIVERSIDE AVE., NEWARK 4, N. J. · HUmbolt 3-3640

"Serving industry with cleaning and stripping compounds"

Name and Address	Subject	Area
E. M. Relitz 2751 E. Jefferson Ave. Detroit 7, Mich.	Anozinc Protective Dips, etc. Use of Rack Coatings, etc.	Middlewest
C. W. Carter 2751 E. Jefferson Ave. Detroit 7, Mich.	Anozinc Use of Rack Coatings, etc.	Middlewest
Dr. J. E. Stareck 2751 E. Jefferson Ave. Detroit 7, Mich.	Anozinc Protective Dips, etc.	Middlewest
R. J. Wooley Detroit 7, Mich. 2751 E. Jefferson Ave.	Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Copper Plating, etc.	Middlewest and Far West, timed with trips made at three months' intervals.
C. H. Eldridge 2751 E. Jefferson Ave. Detroit 7, Mich.	Anozinc Protective Dips, etc. Use of Rack Coatings, etc. Copper Plating, etc.	Middlewest
J. J. Hanney 2751 E. Jefferson Ave. Detroit 7, Mich.	Copper Plating, etc.	Middlewest
The Cowles Detergent Co. (c) Technical Department Bowne Hall Syracuse University Syracuse 10, N. Y.:		
Dr. Clinton W. MacMullen	Wetting Agents	New York, Pennsylvania, Ohio, Michigan, Illinois
Dr. Frederic C. Jeln	Electropolishing	New York, Pennsylvania, Ohio, Michigan, Illinois
LaSalco, Inc. (c) 2818-38 LaSale St. St. Louis 4, Mo.:		
F. A. Menniges	Barrel Plating Equipment Sangamo Ampere Hour Meter	Any Branch after January 1, 1946
H. J. Struckhoff	Barrel Plating Equipment Sangamo Ampere Hour Meter	Any Branch after January 1, 1946
B. G. Daw	Barrel Plating Equipment Sangamo Ampere Hour Meter	Any Branch after January 1, 1946
A. A. Klein (c) Norton Company Worcester 6, Mass.	Abrasives and their Uses	East and Middlewest

You *Step Up* Polishers' Production Average of 47% More Pieces per Head with

GRIPMASTER
PAT. PEND
POLISHING WHEEL CEMENT

As reconversion gets under way, the efficiency of your polishing wheel adhesive becomes increasingly important. One test will prove to you . . . as it has proved to countless others . . . that Gripmaster's secret new high-heat resisting ingredient banishes glazing, steps up polishers' production an average of 47% more pieces per head! With Gripmaster, *one test tells all* . . . because Gripmaster's one grade grips *all* grains—250 to 20. Send for generous free sample today!

GRIPMASTER DIVISION
Michigan Bleach & Chemical Co.
12345 Schaefer Highway
Detroit 27, Michigan

IN CANADA:
Nelson Chemical Co.
Windsor, Ontario

Please send us a generous free sample of Gripmaster so we can make the "*one test that tells all.*"

COMPANY_____

ATTENTION:_____

ADDRESS_____

CITY_____ STATE_____

INDUSTRY NEWS

Chemist-Plater Available

Eight years' practical experience in production plating, control and maintenance of solutions. Age 29. Will locate anywhere. MR-9A. MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

Chemical Engineer Wanted

By well-known metal producer — must have thorough knowledge of electro-chemistry for development and sales work on electro-deposition and plating. Work involves some travel and liaison work with laboratories and plant. Applicant must be energetic, cooperative and have sound technical ability. Should have practical experience in plating. MR-9B, MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

Electroplating Specialists Wanted

For work on fee basis in various fields. Important research organization requires outside assistance. State qualifications, specialty, background and references. MR-9C, MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

Sales and Service Engineer

Wanted for eastern territory, Sales and Service Engineer with experience in electroplating; excellent opportunity with established company. MR-9E, MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

Metal Specialist

Well-known national concern manufacturing materials used in processing, maintenance and cleaning operations has opening for man who has had good experience in problems of metal shaping, forming and finishing operations. Splendid opportunity now and in post-war period. Location New York, some traveling. Give full details of age, experience, salary, etc. If data indicates necessary experience, interview will be arranged at our expense. Metal Specialist. Box 567, Church St. Annex, N. Y. P. O.

Salesman Wanted

Experienced in selling electroplating and polishing equipment and supplies; Metropolitan New York territory; excellent opportunity with established company. MR-9F, MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

Technical Sales and Service Representatives

Men under 45 years of age with previous sales or service experience and knowledge of manufacturing operations or mechanically inclined. Several established territories including some in mid-western location. Men must be able to relocate. Car essential. Trained in New York at our expense to qualify in use and servicing of our cleaning, drawing, stamping, cutting and rust-proofing materials. Excellent opportunity for right man now and in post-war period as our organization sells to and serves practically every type of industry. Attractive compensation arrangement. Give full details of age, experience, etc. Replies treated confidentially. MR-9D, MONTHLY REVIEW, P.O. Box 168, Jenkintown, Pa.

"Tin Strip" Described

A one-page flyer, available on request, concisely details the use and characteristics of this relatively new material produced by Sulphur Products Co., Inc., Greensburg, Pa. The manufacturer states the material quickly strips tin without damage to basis metal and does not require use of current.

Jos. T. Sullivan Joins MacDermid Inc.

MacDermid Incorporated announces the appointment of Mr. Joseph T. Sullivan as Technical Sales Representative for Northern Massachusetts, Maine, Vermont, and New Hampshire.

Mr. Sullivan is a graduate of Yale Engineering School, where he received his B.S. degree in Metallurgy in 1934. In 1935 he joined the New Haven Clock Co. as Assistant Chemist in their laboratory and subsequently was made Chief Chemist in charge of all metal finishing departments.

Mr. Sullivan is a member and past President of the New Haven Branch of the American Electroplaters' Society, and is also a member of the Metal Society.

Yerger Joins Lea

C. W. Yerger, formerly Executive Vice-President of the Hanson-Van Winkle-Munning Co., has joined the executive staff of the Lea Mfg. Co. and has been elected Chairman of the Board of Directors. He is to develop post-war plans for the company as well as to assist in the production and distribution of their present products widely used in connection with burring, polishing, buffing and plating and the general field of finishing of metal and non-metal articles.

Industrial Chemicals and Specialties Booklet

Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., announces a new pocket-size booklet "Chemicals and Specialties" which lists the industrial chemicals and specialties manufactured by Penn Salt under the Sales Division controlling them. In addition, data is included on the industries served by Penn Salt. Addresses of district sales offices and plants are also given. Copies can be obtained upon request to the Philadelphia office.

Inservice Training Course

The University of Michigan is about to offer an Inservice Training or Short Course in Environmental Controls for Industrial Processes with special reference to metal

(*Continued on page* 928)

...Look to UNICHROME

On the use of a better protective coating may depend the success of your product—either in selling it or in service. So, if you're wrestling with a problem – like resistance to sweaty hands or outdoor exposure, heat or abrasion, humidity or alcohols – call on Unichrome Coatings.

We believe we can offer you a solution that will exactly meet your needs, because—
United Chromium through experience and research *knows* protective coatings –both organic and electrolytic.

Our development and production facilities enable us to work with the widest variety of materials. Melamines, Ureas, Phenolics, Alkyds, Vinyls as well as the Celluloses are all grist for our mill. By varying the types of resins, solvents and plasticizers, we have been able to obtain coatings with the *right* combination of properties for a particular application.

The result—Unichrome Organic Coatings in a range of formulations are suitable to meet your most exacting production and service problems. To find out how they may improve your products—write us—giving the nature of the surfaces to be coated and the exact requirements to be met.

OTHER U. C. PRODUCTS AND PROCESSES TO SERVE YOU

CHROMIUM PLATING for wear-resisting, oil-retaining and other types of finishes.

☆**UNICHROME ALKALINE COPPER** for smooth, lustrous copper plating in a non-cyanide bath.

☆**ANOZINC** salts for anodic treatment of zinc giving greatly increased corrosion-resistance.

☆**UNICHROME DIP** for increased corrosion resistance of zinc and cadmium—without electric current.

☆**UNICHROME STRIP** for speedy removal of copper, chromium, zinc, etc.

☆**UNICHROME RACK COATINGS**

☆**UNICHROME STOP-OFF LACQUERS AND COMPOUNDS**

☆**UCILON** corrosion-resistant coatings for protecting surfaces against acids, alkalies, water, gasoline and various corrosive chemicals.

☆Trade Mark Reg. U. S. Pat. Off.

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street
New York 17, N. Y.
Waterbury 90, Conn.
Detroit 7, Mich.

INDUSTRY NEWS

(*Continued from page 926*)

working industries. The topics include the following: Environment Controls in Industrial Health; Principles of Industrial Ventilation; Selection and Maintenance of Equipment for Process Control; Foundry Layout; Foundry Ventilation; Welding and Flame Cutting Processes; Metal Cleaning Processes; Painting and Rustproofing; Electrolytic Processes; Plant Housekeeping and Sanitation.

The course is being given at the request of the Michigan Industrial Hygiene Association. For information write School of Public Health, University of Michigan, Ann Arbor, Michigan.

Catalog of Modern Polishing Room Accessories

Time-saving accessories that speed production and promote safety in polishing, buffing and de-burring are illustrated and described in the new Manderscheid Bulletin 102.

Items included are the Semi-Automatic Tube Polishing Machine — Balance Ways and Mandrels — Polishing Lathe Chucks and Tapered Screw Points — Polishing Lathe Collars, Wrenches, Flanges and Nuts — Polishing Wheel Balance Weights, Bushings and Reducer Bushings — Buffing Wheel Rakes — Emery Troughs and Covers.

Bulletin 102 is available on request to the Manderscheid Company, 605 West Washington St., Chicago 6, Ill.

FOR SALE **Available for Immediate Shipment**

1—5000/2500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC COMPANY** Motor Generator Set. Separately Excited. Excellent Condition. Full Control Equipment.

1—4000/2000 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY** "INTERPOLE" DESIGN Motor Generator Set. Separately Excited. Complete Control Equipment.

1—4000/2000 AMPERE, 6/12 VOLT, **CHANDEYSSON ELECTRIC COMPANY** Motor Generator Set. Synchronous Motor Drive. Modern Design. Excellent Condition. Full Control Equipment.

1—4000/2000 AMPERE, 5/10 VOLT, **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. Separately Excited. Full Control Equipment.

1—4000/2000 AMPERE, 6/12 VOLT, **A. P. MUNNING COMPANY** "OPTIMUS" DESIGN Motor Generator Set. Separately Excited. Excellent Condition. Full Control Equipment.

1—3000/1500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC COMPANY** Motor Generator Set. Separately Excited. Excellent Condition. Full Control Equipment.

1—2500/1250 AMPERE, 12/24 VOLT, **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. Separately Excited. Excellent Condition. Full Control Equipment.

1—2000/1000 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE ELECTRIC CO.** Motor Generator Set. Separately Excited. Excellent Condition. Full Control Equipment.

1—1500/750 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY** Motor Generator Set. Excellent Condition. Complete Control Equipment.

1—1500/750 AMPERE, 6/12 VOLT, **AMERICAN GIANT** Motor Generator Set. Complete Control Equipment. Excellent Condition.

1—1440/720 AMPERE, 6/12 VOLT, **UDYLITE (MALLORY)** RECTIFIER without Voltage Regulator. 220 volts, 3 phase, 60 cycle Imput. Excellent Condition.

1—1000/500 AMPERE, 6/12 VOLT, **A. P. MUNNING COMPANY** "OPTIMUS" DESIGN Motor Generator Set. Complete Control Equipment. Excellent Condition.

2—800/400 AMPERE, 6/12 VOLT, **HANSON & VAN WINKLE COMPANY** Motor Generator Sets. Excellent Condition. Full Control Equipment.

1—400 AMPERE, 40 VOLT, **HOBART ANODIZING** Motor Generator Set. Practically New, with Complete Control Equipment.

1—500 AMPERE, 24 VOLT, **HANSON & VAN WINKLE COMPANY** DIRECT CURRENT ANODIZING Motor Generator Set. Interpole Construction. Excellent Condition. Full Control Equipment.

M. E. BAKER COMPANY **143 SIDNEY STREET CAMBRIDGE, MASS.**

We don't lay claim to infallibility. But we do manage, pretty consistently, to supply finishes that escape the efforts of others. Why not, then, look to us for the finish you need?

DURALAC CHEMICAL CORPORATION

LISTER AVENUE NEWARK 5, N. J.

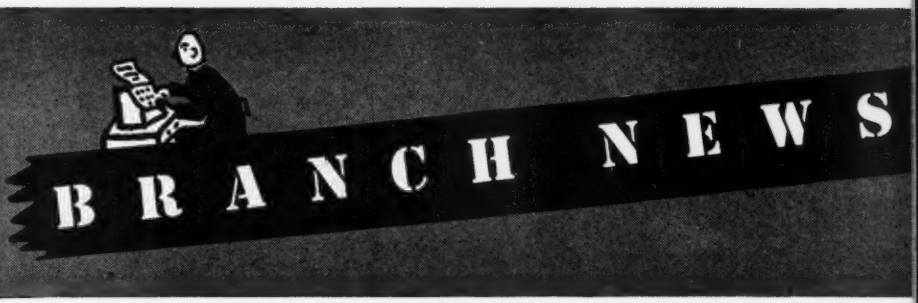
So many ways and only one can be the best

GUIDANCE based on the practical experience of welding many thousands of tanks for plating service is what you may expect from Storts engineers when you are planning complete new cycles or remodeling old installations. This experience has proved that the best way to achieve highest utility values and complete customer satisfaction is to be particular about design details and to insist upon properly executed weldmanship throughout. It will pay you to phone Meriden 5800 regarding your next job — and get started on the best way.

STORTS WELDING COMPANY

42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specification



DAYTON BRANCH

The July meeting of the Dayton Branch was held in the laboratories of Chemical Developments Corporation.

Our hosts conducted us on a very interesting tour through the laboratories, which have an extensive collection of apparatus and equipment for many types of research work.

Mr. E. L. Luaces, the donor of the Dayton Award, presented the trophy to the Dayton Branch. It was accepted by our president Mr. Walter E. Moline. This award, which is a large, beautiful loving cup, is awarded annually to the Branch among the Dayton, Cincinnati, and Indianapolis Branches which during the year has had the highest attendance at monthly meetings relative to its paid-up membership.

Mr. L. A. Critchfield gave a talk on the finishing of small parts and Mr. Stephen Putzan spoke on the finishing of bumper bars. Many interesting questions and comments followed.

At this time our genial hosts showed their hospitality by setting up a light lunch and opening a "Keg" which really hit the spot on a hot evening.

RALPH CLINEFELTER, *Sec'y-Treas.*

CHICAGO BRANCH

The Chicago Branch held its Four-Hundredth Meeting at the Hamilton Hotel on August 10th, with President Paul Krause calling the meeting to order at 8:00 p.m.

After the business meeting President Krause appointed M. H. Longfield to the Librarian's chair for the evening.

On this "Old Timers" night The Lea Manufacturing Co.'s movies of the Cleveland Convention in 1944 and Mr. Longfield's movies of the Milwaukee Convention and the Chicago-Milwaukee picnic in 1938 were shown, the latter with many of the "Old Timers" in the pictures that are not with us any more. After a brief history of the Branch had been presented, Past Supreme President Helge Gilbertson, our President Paul Krause, Past President William Bott, John Lockerbie and E. L. Ingram, all Charter Members of the Chicago Branch, were honored. Jim Hanlon, Rudy Hazucha, and Frank Savage were then called upon to say a few words. The excellent record of all the officers that the Branch has had was posted on a board as well as the name of every member who had been elected since the beginning of the Branch, also the dates of all the Branch Banquets with the names of the chairmen and the titles and authors of the papers presented.

The following questions were in the Question Box.

Q. In a standard silver cyanide solution, which is inducive of a soft plate, high or low free cyanide? *A.* Low.

Q. Does very hot weather have any effect on the application of Cronak finish on zinc plate? *A.* Yes. The temperature of the solution should be controlled.

Q. Would like to know a method of plating chromium direct on sheet stainless steel articles. *A.* Etch in hydrochloric acid and plate in chromium bath at 130 to 135°F.

Rudy Hazucha was honored as "the only man" of the branch. He is the only man to attend a meeting every month for thirty years and the only man to hold every office in the branch. For his many years of service to the Branch he was appointed Chairman of the 1946 Chicago Banquet which should prove to be the colossal affair of the Branch's history.

The meeting adjourned to refreshments,

sandwiches and cigars. A social gathering of "Old Timers" went on for over an hour with many of our members present for the first time in years. There were 74 in attendance and the last members went home at 11:30 p.m.

M. H. LONGFIELD, *Sec'y-Treas.*

PHILADELPHIA BRANCH

The Officers of the Branch held a meeting at the request of the Board of Managers, Tuesday, July 17, 1945 at the home of the secretary. President Zurbach called the meeting to order at 8:30 p.m. with all officers except the two vice-presidents present.

Several communications were read and noted. The application of James M. Hite, associate, was referred to and approved by the Board of Managers and he was elected to membership. Delegate Joseph Underwood made the convention report and received a rising vote of thanks.

A motion to offer Dr. A. K. Graham, the new Executive Secretary, fullest co-operation of the Branch in his new position was carried.

After much discussion of where the September dinner meeting should be held George Gehling, Gene Zurbach, Nat Verrell, and George Long agreed to bend their efforts to find a suitable and centrally-located place.

ROCHESTER BRANCH

The Rochester Branch reported on July 19 the election of the following Officers for the year 1945-46:

President—Paul H. Tufts, Vice President—William Tucker, Sec. Treas.—Donald C. Blum, Librarian—Joseph Hull, Board of Managers—John Q. Adams, Charles Hendershott, Sylvester P. Gartland, Henry Cameron, Fred Bruening.

SAN FRANCISCO BRANCH

The San Francisco Branch held a regular meeting, Thursday, July 12, 1945 at El Jardin, San Francisco. Dinner was served at 7:00 p.m. Twenty members were present. Four new members were elected.

Herbert N. Bruce, Naval Air Station, Alameda, presented an excellent paper on Indium Plating, covering various phases of his subject, especially the use of indium on silver and lead plated steel airplane parts. Samples were passed around for inspection as was a photograph of the apparatus used for the indium plating operation. This device, powered by a rectifier, was designed by F. W. Huntington, Process Group Supervisor, Alameda Air Base. Post-war possibilities were explored with reference to the job shop. An interesting discussion, participated in by many members, followed.

* * * *

The San Francisco Branch held a regular meeting at the Hotel Coit, Oakland, Thursday, August 9, 1945. Dinner was served at 7:00 p.m. with twenty-five present. Visitors were E. R. Frost and Harold Miller of Eitel McCullough, Inc., San Bruno, Cal., Curtis Young, Kelite Products, A. McAteer, Jersey City and H. E. Adams, Anderson, Ind. Branch, both now located at Mare Island, Calif. Two new members were elected. An Open Forum with questions and answers followed, with President Kistler acting as moderator. Several interesting films, depicting operations of the U. S. Air Forces in the European and Pacific theaters, were then shown by Mr. Neilson through the courtesy of the U. S. Naval Air Station, Alameda.

J. R. PATTENGER, *Sec'y-Treas.*

If you forgot ~

DO IT NOW!!

Send your order for

Dr. Glasstone's book

"THE FUNDAMENTALS OF ELECTROCHEMISTRY AND ELECTRODEPOSITION"

Price $2.00

Send Check or Money Order to

National Headquarters
A. E. S.

P.O. Box 168 Jenkintown, Pa.

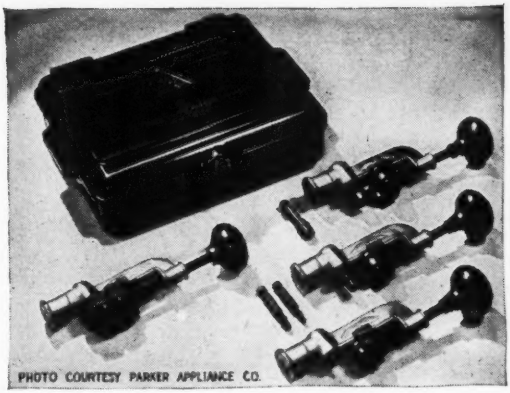


PHOTO COURTESY PARKER APPLIANCE CO.

BLACK-MAGIC

DEEP-PENETRATING BLACK OXIDE FINISH

A Permanent 1-Bath Black for Steel & Iron

This single bath gives iron and all steels except stainless a dense, permanent black that won't rub off (penetration .0001"). Very flexible. Products may be formed after processing. Also an effective rust inhibitor and a fine bond for paints and lacquers. Chemical reaction at 300° F. Non-priority. Ordnance approved. There are also BLACK-MAGIC baths for zinc, copper, brass and cadmium.

SILCO

GLASS-BASE PROTECTIVE SPRAY COATING

Excellent protective and ornamental coating for steel lockers, radio equipment, mufflers, stove and heater parts and other steel and brass articles. Spray on and dry at 200° F.; then bake at 350° F. in any industrial oven. Beautiful colors. Stands heat up to 1000° F. Highly resistant to corrosion, abrasion, impact. Priority free. Navy and other approvals.

BLACK-MAGIC BLACKING SALTS for STEEL, IRON COPPER, ZINC CADMIUM

•

WITCH-DIP WITCH-OIL FINAL FINISHES

•

SILCO PROTECTIVE COATING

•

Cleaners Wetting Agents Acid Inhibitors Heat Treating Salts

•

MITCHELL-BRADFORD

CHEMICAL COMPANY

MODERN METAL FINISHES

2446 Main St., Stratford P. O., BRIDGEPORT, CONN.

CHICAGO OFFICE: 111 W. Jackson Blvd.—DETROIT: June & Co.—CLEVELAND: Universal Paint & Varnish Co.—ST. LOUIS: G. S. Robins & Co.—INDIANAPOLIS: Stovall Equipment Co.—OAKLAND, CAL.: Geo. A. Kushman Co.

Parts completely CLEANED in less than 1/3 former time!

THE satisfactory cleaning of ball bearings in maintenance and inspection work was a problem recently given to the OPTIMUS Laboratory for an answer. Grease, carbon and shop dirt were encrusted thickly. Previous cleaning time using a solvent type cleaner of another make, was ten minutes.

New solvent cleaner does the job

OPTIMUS Solvent No. 2 was used diluted 1 to 7 parts in fuel oil, in a spray-type washer at 20-lbs. pressure. Result—freedom from toxicity and irritating fumes, and *parts more thoroughly cleaned than before*—in 3 minutes flat!

This new OPTIMUS product furnishes a carefully blended mixture, which when mixed in kerosene or other hydro-carbon diluent, removes soil from the work by solvent cleaning action. Its odor is clean, non-toxic and non-irritant.

Proper solvent blending provides more versatility in the selective attacking of the greases and dirts to be removed. OPTIMUS Solvent No. 2 is stable and long-lasting.

OPTIMUS Solvent No. 2 can be used in a kerosene and water emulsion. A water rinse emulsifies OPTIMUS Solvent No. 2 and kerosene mixtures readily to yield physically clean surfaces, suitable for further processing. This solvent can be used, properly diluted with water, as a pre-soak prior to electro-cleaning to remove tripoli, rouge and similar buffing compounds.

WRITE FOR test sample of OPTIMUS Solvent No. 2 to try out in your cleaning operations.

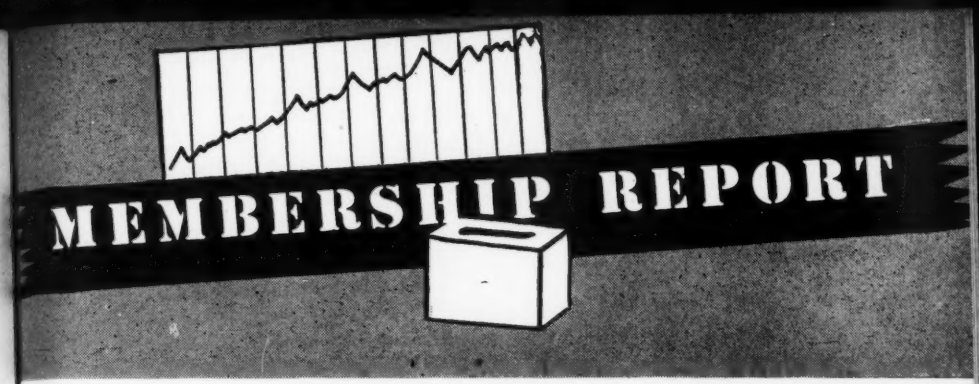
OPTIMUS DETERGENTS COMPANY

130 CHURCH STREET, MATAWAN, N. J.

ENGINEERS AND MANUFACTURERS

OPTIMUS DETERGENTS

FOR INDUSTRY



RAYMOND J. O'CONNOR

Chairman, Membership Committee

ELECTIONS

Chicago Branch

Randolph R. Stark, 1622 Sherwin Ave., Chicago 26, Ill.

Wilbur O. Zinn, 609 W. Fulton St., Chicago, Ill.

John Zito, 706 S. Morgan St., Chicago 7, Ill.

New York Branch

Richard Carnevale, 27½ Morton St., New York 14, N. Y.

Harry Dwoskin, c/o Manhattan Plating Co., 119 W. 33rd St., New York, N. Y.

Bernard Seltzer, 2137 Grand Ave., Bronx, New York.

Joseph Katz, 114 Lexington Ave., New York, N. Y.

Abraham Neumann, 1352 47th St., Brooklyn 19, N. Y.

Eugene De Mascio, 454 Van Buren St., Brooklyn 21, N. Y.

Philadelphia Branch

James M. Hite, 1500 Melrose Ave.. Lynnewood Park, Upper Darby, Pa.

Providence-Attleboro Branch

Halliday E. S. Thompson, 96 West St., Attleboro, Mass.

St. Joseph Valley Branch

Orville E. Adler, National Standard Co., 8th & Howard, Niles, Mich.

Chas. J. Baldwin, 516 E. 6th St., Michigan City, Ind.

John A. Baumgardner, W. Lexington Rd., RR #3, Elkhart, Ind.

Donald R. Cook, 2206 S. Main St., Elkhart, Ind.

Frederic H. Craven, 622 Park Ave., South Bend 16, Ind.

Harry Samuel Deitrich, 1611 Cherry St., Niles, Michigan

Darrel E. Evans, Precision Plating Corp., 1723 S. Main St., South Bend 14, Ind.

Julius A. Farkas, 2618 Bulla Rd., South Bend, Ind.

Donald F. First, 204 W. High, Dowagiac, Mich.

Raymond A. Friend, National Standard Co., Niles, Mich.

Claude Leroy Funk, 1333 E. Beardsley Ave., Elkhart, Ind.

James E. Gray, 601 W. High St., Elkhart, Ind.

James M. Hedges, 205 E. Telegraph St., Dowagiac, Mich.

Elmer E. Lepel, 328 Michigan St., Niles, Mich.

Charles Edward Lichtenberger, 136 Michigan St., Elkhart, Ind.

Clare E. Luke, 604 N. Main St., Berrien Springs, Mich.

Alfred B. Matern, 730 E. Pennsylvania Ave., South Bend 18, Ind.

Worth W. Mathews, 522 Winsted St., Kalamazoo 8, Mich.

Frank H. Negley, National Bank Bldg., South Bend, Ind.

George Ellis Nidy, Box 35, Three Rivers, Mich.

Glenn Robert Nunemaker, Lapaz, Ind.

Victor E. Peterson, 1641 Hickory St., Niles, Mich.

Chester Edward Prough, Excel Corp., 1120 N. Main, Elkhart, Ind.

Clare E. Ransbottom, 1039 Taylor St., Elkhart, Ind.

Otis A. Ray, 319 Oakridge Ave., Goshen, Ind.

Forrest Wain Robison, 312 S. 8th St., Goshen, Ind.

John W. Saylor, 749 - 29th St., South Bend, Ind.
Theodore D. Shafer, 930 - 21st St., South Bend, Ind.
Richard M. Tuthill, Villa Apts., Cleveland Rd., South Bend 17, Ind.
Henry Frederick Welling, R. 1, Dowagiac, Mich.
Sterling Wiener, 2917 Prast Blvd., South Bend 19, Ind.
E. V. Wiley, 312 N. Third St., Goshen, Ind.

San Francisco Branch

Otho Peter Ergenbright, 1573 Lincoln Ave., Alameda, Calif.
Ronald Henry Gordon, 1505 St. Francis Way, San Carlos, Calif.
Effendi Birney Leland, 1368 Gardner Blvd., San Leandro, Calif.
Joy R. Longfellow, 572 W. Santa Clara St., San Jose, Calif.
Robert E. Medanich, % Kelite Prods., Inc., 1700 - 6th St., Berkeley 2, Calif.
Orin Robert Olden, Jr., 1400 - 16th St., San Francisco, Calif.

APPLICATIONS

New York Branch

Joseph Albert Morin, Consolidated Razor Blade Co., Jersey City, N. J.
Joseph E. Moore, Ranger Aircraft Corp., Farmingdale, L. I., N. Y.

Providence-Attleboro Branch

Henry A. Creeden, 5 County St., Attleboro, Mass.
Antone J. Oliver, 49 Lexington St., Attleboro, Mass.
Michael L. Nitso, 31 Emory St., Attleboro, Mass.

TRANSFERS

N. F. Blackburn from Buffalo Branch to Baltimore Branch
Geo. A. Bock, Jr., from Chicago Branch to St. Joseph Valley Branch
E. F. Dingley from Milwaukee Branch to San Francisco Branch
Dr. C. B. F. Young from New York Branch to Providence-Attleboro Branch

REINSTATEMENT

New York Branch

Mariano Ranno, % Imperial Plating Co., 100 Metropolitan Ave., Brooklyn 11, N. Y.

SUSPENSIONS

New York Branch

Sergei Riazanoff
Joseph Scapollite

DEATHS

New York Branch

James Puritan

RESIGNATIONS

Waterbury Branch

D. A. Palmer
John W. Dawson

Chicago Branch

W. Covington

Pittsburgh Branch

C. W. Dermitt

Providence-Attleboro Branch

George J. Lederer

LIPSON GAGE

(*Continued from page* 892)

thickness band. It is believed that this reproducibility is greater than the usual uniformity of the coating, especially in the lower ranges, and should be adequate for most practical uses.

Discussion

The question of the service model *versus* the research model is, of course, dependent on the accuracy desired. However, for most applications the service model is desirable because of the following characteristics:

1. Greater simplicity,
2. More rapid determination,
3. Lower cost, and
4. Voltage-compensating feature.

The voltage-compensating feature may be included in the research model although much of the increased accuracy of this design would be sacrificed since vernier readings from the indicator would probably be impractical.

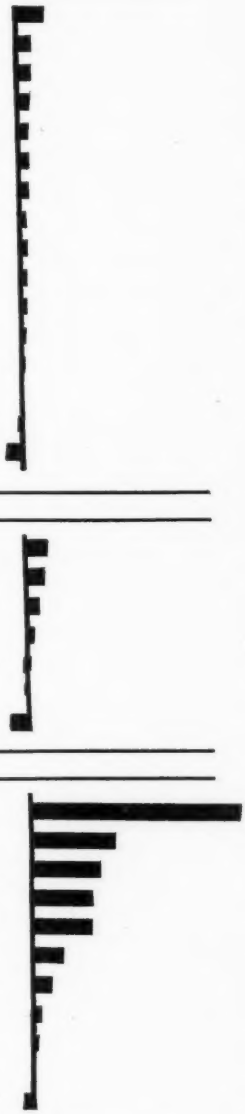
For special applications, the research model instrument may be preferred, although it would be necessary to calibrate the instrument at the beginning of each test period.

Acknowledgment:

The author wishes to acknowledge the assistance rendered by the members of the Ordnance Laboratory Division, Frankford Arsenal, in particular by — J. K. Desmond, J. Mazia, and T. A. Read.

MEMBERSHIP CHART

BRANCH	May 1945	Change in Membership	Percent Change
FIRST GROUP			
PHILADELPHIA	154	+12	+ 7.8
CHICAGO	357	+13½	+ 3.8
CLEVELAND	143	+ 5	+ 3.5
BOSTON	157	+ 4½	+ 2.9
NEWARK	213	+ 6	+ 2.8
DETROIT	390	+10	+ 2.6
LOS ANGELES	151	+ 3½	+ 2.3
NEW YORK	122	+ 1	+ 0.8
BRIDGEPORT	191	+ 3½	+ 1.8
GRAND RAPIDS	118	+ 2	+ 1.7
BALTIMORE-WASH.	121	+ 2	+ 1.7
INDIANAPOLIS	123	+ 1½	+ 1.2
WATERBURY	112	+ 1	+ 0.9
ST. LOUIS	116	—	—
TORONTO	119	— 1	— 0.8
HARTFORD	126	— 6	— 4.8
SECOND GROUP			
PROV.-ATTLEBORO	101	+ 6½	+ 6.4
ROCHESTER	90	+ 4½	+ 5.0
PITTSBURGH	80	+ 2½	+ 3.1
BUFFALO	89	+ 1	+ 1.1
NEW HAVEN	106	— ½	— 0.5
MILWAUKEE	107	— ½	— 0.5
DAYTON	109	— 5½	— 5.0
THIRD GROUP			
ROCKFORD	23	+14	+61.0
TWIN CITY	52	+12½	+24.1
AUSTRALIA	51	+10	+19.6
SAN FRANCISCO	55	+ 9½	+17.3
TOLEDO	54	+ 9	+16.7
SYRACUSE	57	+ 5	+ 8.8
LANCASTER	39	+ 2	+ 5.1
JACKSON-LANSING	62	+ 1	+ 1.6
SPRINGFIELD	73	+ ½	+ 0.7
CINCINNATI	57	—	—
MONTREAL	54	— 1	— 1.9



Membership May 1, 1945 = 3972
Membership Sept. 1, 1945 = 4146

Gain in Membership = 174
Percent of Gain = 4.2

STRUCTURE OF ELECTRODEPOSITED COPPER-ZINC ALLOYS

(*Continued from page* 886)

alloys which extend over a large composition range (such as alpha brass) disorders can arise in the crystal structure so that the composition of the solid solution is constant only over a small lattice region. Hence the crystallites themselves grow from small lattice blocks of varying composition and, therefore, of varying lattice constants. This situation does not effect the specific resistance which is determined only by the average atomic distance, and thus increases along with the lattice constant as the zinc concentration of the alpha solid solution increases.

The Debye-Scherrer patterns of the other phases of the copper-zinc alloys indicate a stronger lattice distortion in the electrolytic than in the recrystallized alloys, but this manifests itself neither in the specific resistance nor in a definite increase in hardness.

Summary

The change in composition of copper-zinc deposits is governed by a range of sharp inflection in the cathode potential *vs.* current density curves. The hydrogen overvoltage at electrodeposited alloys corresponding to the epsilon or eta phases of brass is the same as at zinc, but is lower at the copper-rich alloys.

In the electrolytic copper-zinc alloys the same phases appear (except for the superlattice of beta brass) as in the recrystallized alloys. The phase boundaries agree well in all cases.

The structure of the electrodeposited alloys changes with the conditions of deposition, although for a single phase characteristic structure formations may be observed.

The interference rings of the Debye-Scherrer patterns lead to the conclusion that, especially in the electrodeposited alpha phase, there is strong lattice distortion which manifests itself in the alpha brass by a considerably greater hardness than is to be found in the recrystallized alloy. The pronounced lattice distortions found by X-ray studies in all electrodeposited copper-zinc alloys is without definite influence on the specific resistance. They also do not effect the hardness of the beta, gamma and epsilon phases.

REFERENCES

1. C. J. Wernlund, D.R.P. 685,630; F. Oplinger, Met. Ind. (London) **54**, 167 (1939).
2. H. Nakamura, Sci. Paper Inst. Phys. Chem. Res. Tokyo **2**, 287 (1926); A. Roux and J. Cournot, Rev. Metallurg. **26**, 655 (1929); U. Dehlinger, Z. Metallkunde **24**, 197 (1932).
3. W. Pfanhauser, Galvanotechnik, Leipzig, 1941, p. 706.
4. For a bibliography see W. Pfanhauser, Galvanotechnik, Leipzig, 1941, pp. 683-706.
5. E. Raub and B. WWullhorst, Z. für Elektrochemie **48**, 342 (1942).
6. This is undoubtedly a reference to the work of Raub and Engel, Z. für Elektrochemie **49**, 89 (1943).—H. J. R.

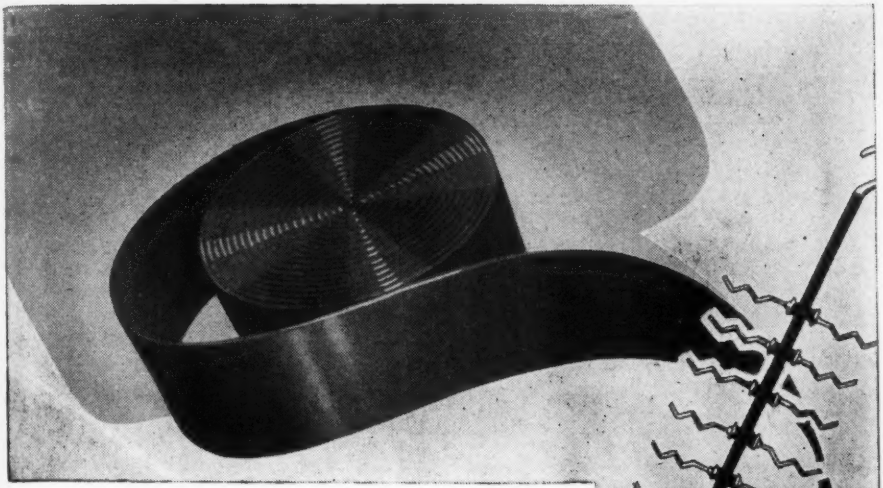
PERMAG
Cleaning Compounds

PERMAG Compounds reach the minute complex parts and clean—

- **Efficiently**
- **Economically**
- **Quickly**
- **Without injury to soft metal surfaces.**

Let us help you with your cleaning problems.

Magnuson Products Corp.
Mfrs. Cleaning Compounds for Industry
50 Court St., Brooklyn 2, N. Y.
Nationally Represented
Warehouses in Chief Cities
In Canada: Canadian Permag Products, Ltd.
Montreal - Toronto



• Built into Tygon Tape are properties which the experience and "know-how" of top platers everywhere, approve. Here is an insulating tape designed to make plating rack protection simpler, more positive.

It has stretch without snap to make application easy, to assure an even, uniform wrapping tension without entrapped air. Its smooth surface does not "wet" easily, lessens dragout. Its excellent dielectric qualities decrease current losses. Its tough, resilient nature resists mechanical abrasion and impact shocks. And its almost "universal" corrosion-resistance provides real rack protection from chemical attack.

Available at your dealers in convenient ¾" wide rolls, or write direct.

Always

EXPECT QUALITY FROM

Egyptian Finishes

Quality...versatility...economy...always have been outstanding characteristics of Egyptian finishes.

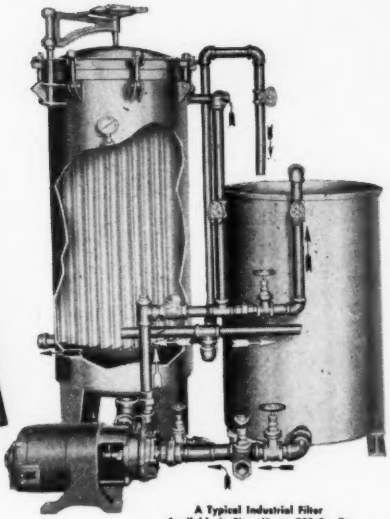
Through war years Egyptian's high standards steadily have been maintained, with production largely on finishes for war goods, of course.

Now as American industry swings back to production for peace, "quality" and "Egyptian" continue to be synonyms.

We invite inquiries regarding your finish needs, present and future.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

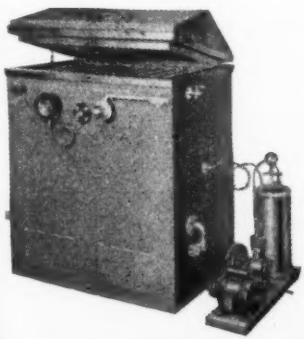
EGYPTIAN
SPECIALIZED PRODUCTION FINISHES



A Typical Industrial Filter
Available in Sizes Up to 390 Sq. Ft.
of Filtration Area

HERE IS GOOD NEWS FROM THE PLATING FRONT!

Industrial Plating Solution Filters are now coming equipped with AIRWASH — the new cleaning device that does a thorough job in a few minutes without opening the filter. You will welcome this new labor saving method of cleaning filters. The Industrial AIRWASH Device does a complete job of removing cake and sludge from filter cloths. There is no loss of time before starting the new filter cycle. Industrial Filters are furnished in sizes and models to fit your needs. Ask for our recommendations on the proper equipment to do your job better.



SALT FOG
Corrosion Test Equipment

This modern instrument is designed to meet all requirements of latest "Salt Fog Testing Procedure Specifications" to determine corrosion resistance of plated, coated, lacquered or painted parts.

Serious rejection losses on industrial finishes which must meet Army or Navy specifications are avoided by systematic tests with Industrial Salt Fog Test Equipment.

STANDARD SIZES

No. 1—48" long 26" wide 36" deep No. 3—30" long 18" wide 30" deep
No. 2—36" long 24" wide 30" deep No. 4—24" long 15" wide 30" deep
No. 6—14" long 12" wide 12" deep

INDUSTRIAL FILTER & PUMP MFG. CO.

1621-25 WEST CARROLL AVENUE CHICAGO 12, ILLINOIS

*Ventilated NON-FRAYS

THE MARK OF QUALITY

Also
RIPPLE SEWED
CHAMPION PIECED BUFFS

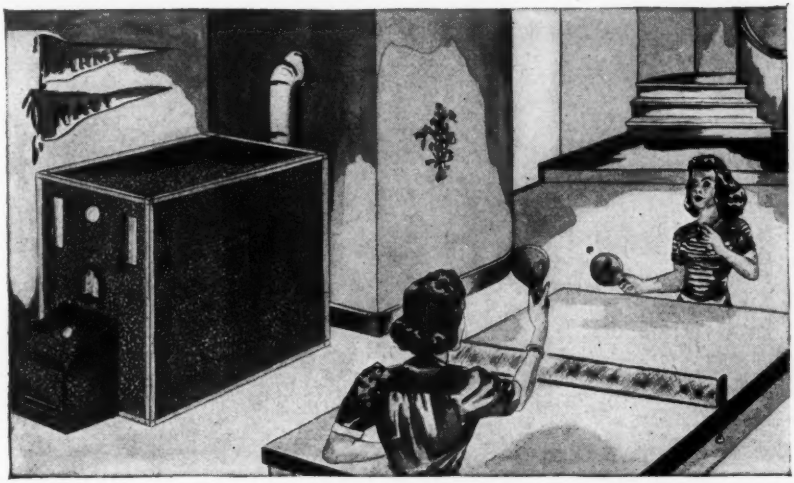
Polishing Wheels and Burring Bobs for every Operation

We are engaged essentially in War Work

*PATENT NOS. 2,027,863; 2,094,650; 1,573,961; RE. 19,894; 2,140,208

F.L.&J.C.
TRADE MARK
CODMAN COMPANY
Buffing and Polishing Wheels
ROCKLAND • MASSACHUSETTS
DETROIT OFFICE 7637 OAKLAND AVENUE
PHILADELPHIA OFFICE, 1123 REAL ESTATE TRUST BLDG.
PHILADELPHIA 7, PENNSYLVANIA

Tomorrow's Basements will be Beautiful—



M&W *WRINKLE* Finish fits the Picture!

Here you see a typical postwar basement—clean, attractively decorated, and providing recreational facilities for the whole family. The necessary plumbing and heating equipment will still be there, but, instead of being eyesores, these units will actually add to the appearance of the room.

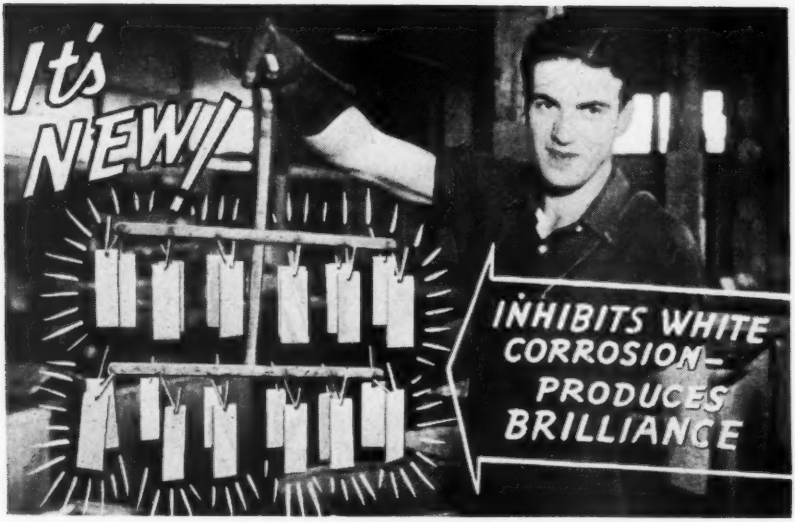
M & W Wrinkle finish fits this picture, for it will put a coating of beauty on your postwar product. Versatile in pattern, alive in color, and resistant to wear, temperature and humidity, a Wrinkle finish will add to the eye appeal of the equipment you manufacture and—

"Eye Appeal gives your Product BUY Appeal"

MAAS & WALDSTEIN COMPANY, NEWARK 4, N. J.

PRODUCERS OF LACQUERS, ENAMELS, SYNTHETICS AND SPECIALTY FINISHES FOR ALL PURPOSES

BRANCHES: 1658 CARROLL AVE., CHICAGO 12 • 6 JERSEY ST., BOSTON 15 • 1228 W. PICO BLVD., LOS ANGELES 15



Pro-Seal
TRADE MARK

Does it for ZINC

You can protect your zinc plated products and at the same time produce a brilliant finish easily and quickly. Promat Pro-Seal can be used following the famous high speed Promat #90-S zinc plating process or can be used to treat any pure zinc surface. Pro-Seal uses no current. Can be hot rinsed or oven dried. Simple to control and very economical.

Independent testing laboratory reports prove that the bright Pro-Seal finish will prevent formation of white corrosion particles in salt spray and humidity tests and meets the specifications of refrigerator shelf manufacturers. Pro-Seal simplifies the production of protected bright zinc plated product.

The value of durable brilliant zinc is obvious. Manufacturers of refrigerator and cabinet shelving, hardware automotive parts and hundreds of other products can use Pro-Seal on zinc to great advantage. Pro-Seal is an excellent alternate for unobtainable prewar finishes and also creates a new field for zinc plated products.

Pre-Seal consists of two simple dips. Three times concentrates of these baths are shipped in carboys and drums. Send today for an initial shipment to make up two forty gallon baths sufficient to treat more than 8,500 sq. ft. of work. $69.86 f.o.b. Waukegan, Illinois.

Write for a Pro-Seal sample for testing or send us your parts for Pro-Seal sample treatment.

PROMAT DISTRIBUTORS

W. D. McDermid Chemical Co.
Bristol, Connecticut

William M. Fotheringham
Buffalo 13, New York

Electro-Processing Equip. & Supply Co.
Saint Louis 4, Missouri

Bart-Messing Equipment Corp.
New York 7, New York

Wagner Brothers
Detroit 2, Michigan

The Foundry Supply Co.
Saint Paul 4, Minnesota

Mr. Henry Atwater
Philadelphia, Pennsylvania

Wagner Brothers
Cleveland 14, Ohio

Crown Rheostat & Supply Co.
Chicago 12, Illinois

Write today for further information to

PROMAT DIVISION, Poor & Company

851 So. Market Street — Waukegan, Ill.

BRANCH DIRECTORY

BALTIMORE-WASHINGTON meets at the Telford Buffeteria, 14th and Decatur Sts., N.W. Washington, D. C. the first Saturday of each month. Secretary-Treasurer, Albert G. Taylor, 1209 E. 25th St., Baltimore 14, Md.

BOSTON meets at the Hotel Statler, Boston, Mass., first Thursday each month. Secretary, A. W. Garrett, 35 Rosemont St., Dorchester, Mass.

BRIDGEPORT meets first and third Friday of each month at Barnum Hotel. Secretary-Treasurer, Joseph G. Sterling, 134 Colony St., Bridgeport 8, Conn.

BUFFALO meets second Friday of each month at Hotel Statler, Buffalo, N. Y. Secretary J. C. Mays, Alfred, N. Y.

CHICAGO meets second Friday of each month at 8 p.m., Hamilton Hotel, 18 So. Dearborn St. Secretary, M. H. Longfield, 1528 South 61 St., Cicero 50, Ill

CINCINNATI meets on fourth Thursday of each month at 8 p.m., at the Engineering Society Headquarters, McMillan St. and Woodburn Avenue, Cincinnati, Ohio. Secretary-Treasurer, Elliott W. Horning, 2425 Kenilworth Ave., Norwood 12, Ohio.

CLEVELAND meets first Saturday of each month at Cleveland Hotel. Secretary-Treasurer, Harvey P. Heil, 12901 Elmwood Ave., Cleveland 11, Ohio.

COLUMBUS meets last Friday of each month at the Battelle Memorial Institute Auditorium, 505 King Avenue, Columbus 1, Ohio at 8:00 p.m. Secretary, David S. Stoker, 1338 Meadow Road, Columbus 8, Ohio.

DAYTON meets second Friday of each month at the Engineers Club, Dayton, Ohio. Secretary-Treasurer, Ralph L. Clinefelter, West Milton, Ohio.

DETROIT meets the first Friday of each month at the Hotel Statler. Secretary-Treasurer, F. L. Clifton, 16536 Inverness, Detroit 21, Mich.

GRAND RAPIDS meets second Friday of each month, 7:30 p.m., at the Rowe Hotel. Secretary, R. Perkins, 916 Fairmount St., S.E., Grand Rapids 6, Mich.

HARTFORD meets third Monday of each month at Hotel Garde, Hartford, Conn. Secretary, F. W. Smith, 46 Cottage St., Meriden, Conn.

INDIANAPOLIS meets at the Hotel Riley, the first Wednesday of each month. Secretary-Treasurer, Quenton Shockley, 4952 W. 12th St., Indianapolis, Ind.

JACKSON-LANSING meets second Tuesday of each month alternating between Home Dairy at Lansing and Hotel Hayes at Jackson. Secretary-Treasurer, R. E. Brown, 3851 Dobie Rd., Okemos, Mich.

LANCASTER meets second Friday of each month at 8 p.m., at Thaddeus Stevens Industrial School, Lancaster, Pa. Secretary-Treasurer, W. H. Fordney, 603 Marietta Ave., Lancaster, Pa.

LOS ANGELES meets the second Monday of each month, 6:30 p.m. at the Rosslyn Hotel, corner Fifth and Main Sts. Secretary-Treasurer, Frank Bunker, 2030 Bay St., Los Angeles, Calif.

MILWAUKEE meets first Friday of each month at Wisconsin Hotel. Secretary-Treasurer, James Durnford, 2370 N. 32nd St., Milwaukee 10, Wis.

MONTREAL meets first Monday of each month at Mount Royal Hotel, Montreal, Quebec, Canada. Secretary-Treasurer, Estelle Gravet, 267 Demarchais Blvd., Verdun, Quebec, Canada.

NEWARK meets first and third Friday of each month at Hotel Robert Treat, Newark, N. J., at 8 p.m. Secretary-Treasurer, George Wagner, 1130 So. Long Ave., Hillside, N. J.

NEW HAVEN meets the first Tuesday of each month at Sterling Chemistry Laboratory, Yale University. Secretary-Treasurer, B. J. Gaffney, 40 Filbert St., Spring Glen, Hamden 14, Conn.

NEW YORK meets second and fourth Fridays of each month, in the Hotel Pennsylvania, 7th Ave. and 33rd St., New York City, N. Y. Secretary-Treasurer, Franklyn MacStoker, 25 Princeton St., Garden City, L. I., N. Y.

PHILADELPHIA meets fourth Friday of each month, in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, Paul Mentzer, Sr., 7242 Bingham St., Philadelphia 11, Pa.

PITTSBURGH meets third Thursday of each month, at 6:30 p.m. at the Roosevelt Hotel, Pittsburgh, Pa. Secretary-Treasurer, Frank Keller, 1102 Hiland Ave., Coraopolis, Pa.

PROVIDENCE-ATTLEBORO meets the third Monday of each month at the Providence-Baltimore Hotel. Secretary-Treasurer, Chas. C. Chace, 11 Friendly Road, Cranston 10, Rhode Island.

ROCKFORD, Secretary, Stuart Golding, 205 Washington St., Rockford, Ill.

ROCHESTER meets third Friday of each month at the Hotel Seneca, Rochester, N. Y. Secretary-Treasurer, Donald C. Blum, 322 Genesee Park Blvd., Rochester 11, N. Y.

SAN FRANCISCO meets the second Thursday of each month, usually at Angelo's, 4307 San Pablo Avenue, Oakland, Calif. Secretary-Treasurer, J. R. Pattenger, 170 Division St., San Francisco 3, Calif.

SPRINGFIELD meets the fourth Monday of each month at the Hotel Charles. Secretary-Treasurer, Paul Lyman, Westinghouse Electric & Mfg. Co., 653 Page Blvd., Springfield, Mass.

ST. JOSEPH VALLEY, Secretary, George Bock, Jr., 177-179 E. Marion St., Elkhart, Indiana.

ST. LOUIS meets first Friday of each month at Central Y. M. C. A., 16th and Locust Sts. Secretary-Treasurer, C. T. McGinley, 8319 Garfield, St. Louis, County 14, Mo.

SYDNEY, AUSTRALIA. Secretary-Treasurer, Lawrence Smith, Box 2064, G.P.O., Sydney, Australia.

SYRACUSE meets second Friday of each month at Bowne Hall, Syracuse University, Syracuse, N. Y. Secretary, Neil Maffei, 206 Union Ave., Syracuse 3, N. Y.

TOLEDO meets first Thursday of each month, in the office of the Vic Miner Co., 329 20th Street, Toledo, Ohio. Secretary, Gaston Bergeman, 703 Pine St., Fremont, Ohio.

TORONTO meets second Friday of each month at Royal York Hotel. Secretary, E. P. Blandy, 369 Prince Edward Drive, Toronto 9, Ont., Canada.

TWIN CITY, Secretary-Treasurer, Robert L. Buckley, 4300 Linden Hills Blvd., Minneapolis 10, Minn.

WATERBURY meets second Friday of the month at Elton Hotel. Secretary-Treasurer, Spencer L. Henn, Apothecaries Hall Co., Waterbury 88, Conn.

ZAPON

DURANITE

High Speed

The Production Finish

DURANITE is the high-speed plastic base production finish. It comes in clear and a wide range of colors for spray, dip or roller-coat application. May be used with infra-red or convection oven baking.

Sorry . . . but some specialized qualities of DURANITE will not be available till raw materials are released. However, some formulas ARE in production—we'll be glad to tell you more about them.

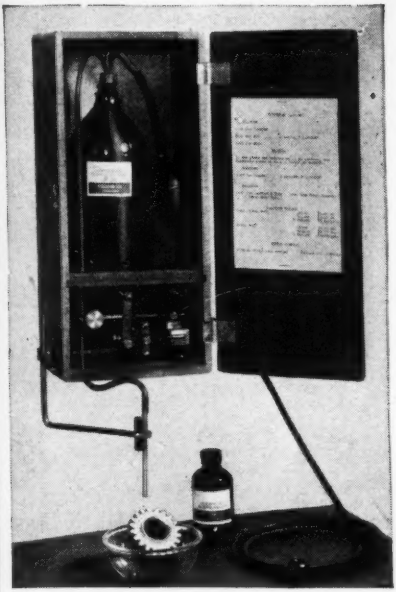
ZAPON

ZAPON DIVISION

ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. Western Sales: No. Chicago, Ill.

SPECIALIZED PRODUCTION FINISHES... *Doing Tomorrow's Job Today!*



THICKNESS

OF

ZINC • CADMIUM
TIN • COPPER

can now be determined
with the new electrically
operated

KOCOUR
AUTOMATIC
DROPPING
UNIT

Write for literature

KOCOUR CO.

4725 S. Christiana Ave.
Chicago 32, Ill.

Specify Kocour Sets from your supplier.

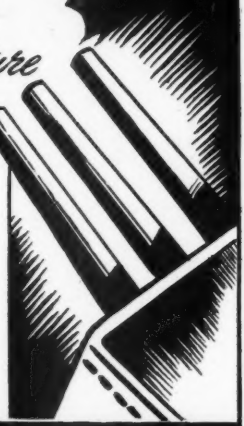
COMPOUND:
Burring, Cutting Down, Polishing, Mirror Finishing
4A CEMENT:
Used for setting up Wheels, Belts, Buffs & etc.
HARRISON & COMPANY, INC., Haverhill, Massachusetts

DOING THE JOB NOW

Equally good for the Future

USE

Removal of heavy oils, grease and drawing compounds from steel parts often presents a difficult problem, which no ordinary cleaning material will solve. **AHCOLOID 70** produces the clean surface necessary for paint, phosphate coatings, electroplating or further fabrication.
And it does its work quickly, efficiently and economically.



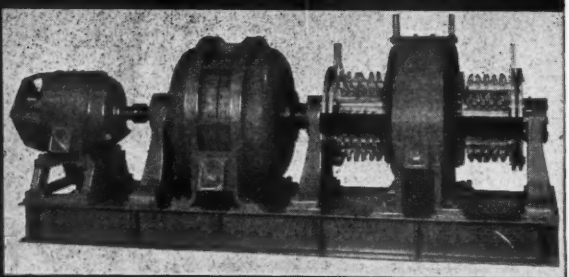
95TH YEAR

APOTHECARIES HALL CO.

WATERBURY 88 CONN.

COLUMBIA MOTOR GENERATORS

FOR ELECTRO-PLATING



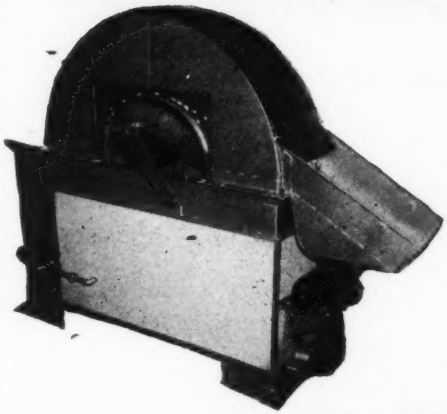
Columbia Generators embody every feature essential for dependable, 24-hour operation. They are built for electroplating service in sizes of 6 to 20 volts, 500 to 20,000 amperes, for anodic treatment of aluminum in sizes of 40, 50, and 60 volts, 500 to 3,000 amperes. Columbia Generators for other electrolytic processes range from ½ to 250 KW, 100 to 40,000 amperes, 6 to 60 volts. Write for full information.

COLUMBIA ELECTRIC MFG. CO.

4519 HAMILTON AVE., N.E. CLEVELAND 14, OHIO

Chicago Office — 1525 E. 53rd St.

NEW AUTOMATIC D'OILER



This machine is only 6' long, 20" wide and 5' high, and degreases cartridge clips at the rate of one a second. It is fed automatically, and unloads automatically. It is an ideal machine for this work and can be used for small stampings and the like.

WRITE TODAY:

MECHANICAL PROCESS COMPANY

15 VALLEY STREET SOUTH ORANGE, N. J.

Hammond

OF KALAMAZOO

1500 to 3000 RPM
The Dial Does It!

VARIABLE SPEED POLISHING and BUFFING LATHES

Finer, Better, More Uniform finishes and increased production result from use of Hammond Variable Speed Lathes — 1500 to 3000 RPM instantly obtainable — the Dial Does It! Write for bulletin.

Hammond Machinery Builders INC

1664 Douglas Ave. • Kalamazoo 54, Mich.
Eastern Branch—71 West 23rd St., New York 10, N.Y.

PEERLESS PRODUCTS

for War Production Work

Special Felt, Tampico, Wire, Cloth, Canvas,
Leather, Polishing Wheels

Special Burring Methods, Compounds and Abrasives,
Oil-Dri Anti-Slip-Treatment for Oily Floors.
Not only absorbs oil, but is fireproof.

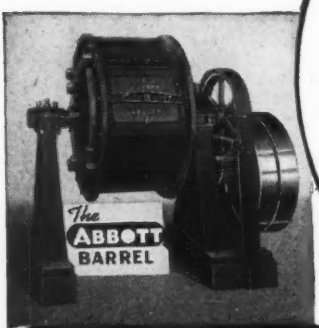
GEORGE A. STUTZ MFG. CO.

Plating and Polishing Equipment and Supplies

1645 CARROLL AVENUE **CHICAGO, ILL.**

The ABBOTT Method

★ TEST WORK REPORT on your parts



PRODUCES RESULTS

TRY IT!

IT'S AN EFFICIENT METHOD OF

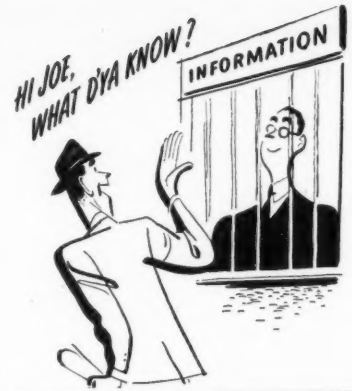
DEBURRING

• • •

★ TEST WORK REPORT

Send a few unfinished samples of the parts to be Deburred and get our Test Work Report . . . it's gratis and gives the facts.

THE ABBOTT BALL COMPANY 1046 NEW BRITAIN AVE. HARTFORD 10, CONN.



WE HAVE ALL THE ANSWERS!

. . . For over fifty years, G. S. Blakeslee & Co. have been engineers of cleaning equipment. Many problems have been solved and many bottle-necks in the production line eliminated with Blakeslee Metal Parts Washers and Solvent Degreasers.

G. S. Blakeslee & Co. would appreciate the opportunity of giving you the information that will help solve your metal parts cleaning problems.

Write for free informative booklet.

BLAKESLEE
Solvent Vapor DEGREASERS
Metal Parts WASHERS

STANDARD AND SPECIALS *Engineered for you*

G. S. BLAKESLEE & CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

PRECIOUS METAL SALTS

Merck Precious Metal Salts are manufactured by precision methods. The finished products must meet extremely high standards for purity and uniformity.

Every plater knows that purity and uniformity are two qualities which supplement the operator's skill in producing a satisfactory plating job.

Prices will be mailed on request.

MERCK & CO., Inc. *Manufacturing Chemists* **RAHWAY, N. J.**

New York, N. Y. • Philadelphia, Pa. • St. Louis, Mo. • Elkton, Va.
Chicago, Ill. • Los Angeles, Cal.

In Canada: MERCK & CO. Limited, Montreal and Toronto

FOR
POST WAR PLATING
Zialite
Reg. U. S. Pat. Off.
Nickel Plating Solution
The one bath especially designed for plating WHITE METAL ALLOYS including ZINC, LEAD and ALUMINUM.

FOR
HARD CHROMIUM
USE
Zialite
ADDITION AGENTS
Send a sample of your present bath to see if it is suitable for conversion to this improved formula.

ZIALITE CORPORATION
143 Exchange Street
Worcester 8, Mass.

★★★★
Divine POLISHING and BUFFING
LATHES
- precision-built
- bench or floor type
- direct or V-belt
- all sizes

WRITE FOR CATALOG TODAY

ARMY E NAVY
Divine Brothers Company
INCORPORATED
POLISHING AND BUFFING
Engineering and Methods Specialists
SINCE 1892 UTICA 1, N.Y.
★★★★

BURNS ROUGES
Black - Red
Green - White

Use to color silver, plated and sterling—gold—platinum — white metal — also brass, copper, tin plate, stainless steel, etc.

Grades designed for every job. Request NEW bulletin "R"

Send for a free sample and compare with what you are using!

E. REED BURNS MFG. CORP.
40 Withers St., Brooklyn 11, N. Y.
Since 1888
The "Know How" People

KIRK AND BLUM
FUME EXHAUST SYSTEMS

Are designed to meet your individual plant needs. They thoroughly remove fumes and vapors, guard workers' health, increase production and reduce costs.

Every K & B Fume Exhaust System is backed by 37 years of specialized engineering experience.

For further details write to

The **KIRK & BLUM MANUFACTURING CO.**
2887 SPRING GROVE AVE.
CINCINNATI 25, OHIO

"YANKEE BRAND"

PROGRESSIVELY BETTER ABRASIVE COMPOUNDS

Tailored to fit all finishing requirements.

Inquiries respectfully solicited

*

E. E. SEELEY COMPANY

(est. 1919)

Manufacturers

BUFFING COMPOSITIONS
FOUNDRY FACINGS

900 Housatonic Ave., Bridgeport, Conn.

Tel. 5-0943

FOR SALE

SLIGHTLY USED BUFFS

LOOSE & SEWED
ANY QUANTITY
ALL SIZES

~

MICHIGAN BUFF CO., Inc.
4054 BEAUFAIT AVE.
DETROIT (7) MICHIGAN

HEADQUARTERS

for

Buffs — Cleaners
Buffing Compositions
Nickel Anodes
Chemicals
General Supplies
Equipment

JACOB HAY CO.

(NOT INC.)

4014 West Parker Avenue
Chicago, Ill.

ACID AND ALKALI PROOF LININGS AND MORTARS

•

ACID PROOF CONSTRUCTION

•

THE CEILCOTE CO.

Consulting and Research Engineers

750 ROCKEFELLER BLDG.
CLEVELAND, OHIO

USE Udylite UNIFIED SERVICE

Udylite is organized and equipped to meet all the requirements of those metal finishers engaged in electroplating, anodizing and polishing. This unified service *INCLUDES:*

EQUIPMENT & SUPPLIES

Regardless of what equipment, controls, supplies or chemicals you need, Udylite can supply you.

LABORATORY SERVICE

Udylite maintains a completely equipped service laboratory, in charge of experienced electrochemists, to test your solutions periodically in order to keep them at full efficiency—this at no cost to you.

ENGINEERING DEPT.

Udylite's mechanical engineering staff is likewise available to design any type of plating equipment to meet your specific requirements.

RESEARCH

Udylite's research engineers, working in their own laboratory, are continuously engaged in projects to further the improvement of metal-finishing processes and equipment. Take advantage of their findings.

FACTORY

Two large manufacturing plants build the standard and special equipment used in metal-finishing.

PILOT PLANT

A pilot plant is available to test under actual plating room conditions, any new procedure you have worked out or which has been developed by Udylite's engineers.

You Get All These Advantages

WHEN YOU STANDARDIZE ON UDYLITE PRODUCTS

THE Udylite CORPORATION

1651 EAST GRAND BLVD.
DETROIT 11, MICHIGAN
OFFICES IN PRINCIPAL CITIES

INDEX TO ADVERTISERS

Abbot Ball Company 950
Alsop Engineering Company 893
American Chemical Paint Co. 868
American Brass Company 869
Apothecaries Hall Co. 948
Baker Company, M. E. 928
Blakeslee & Co., G. S. 951
Burns Mfg. Corp., E. Reed 952
Ceilcote Co. 867
Codman Co., F. L. & J. C. 942
Columbia Electric Mfg. Co. 948
Cowles Detergent Co. 866
Darco Corporation 870
Detrex Corporation 871
Diversey Corp. 907
Divine Brothers Co. 952
Du Pont de Nemours & Co., Inc. 887
Duralac Chemical Corp. 929
Egyptian Lacquer Mfg. Co. 940
Enthone Company 862
Fidelity Chemical Co. 922
General Chemical Co. 910
Gumm Chemical Co., Fred'k. Second Cover
Hammond Machinery Builders 949
Hanson-Van Winkle-Munning Co. Back Cover
Harrison & Company 947
Hay Company, Jacob 953
Industrial Filter & Pump Co. 941
Kirk & Blum Mfg. Co. 952
Kocour Company 947
Lasalco, Inc. 863
Lea Mfg. Co. 908-909
L'Hommedieu & Sons Co. 895
Maas & Waldstein Co. 943
Mac Dermid, Inc. ..... 956 & Third Cover
Magnus Chemical Co. 913
Magnuson Products Corp. 938
McGean Chemical Co. 914
Meaker Company 875
Mechanical Process Co. 949
Merck & Company, Inc. 951
Michigan Bleach & Chemical Co. 924
Michigan Buff Co. 953
Mitchell-Bradford Chemical Co. 933
Mutual Chemical Co. of America 904
Nankervis Company 872
Northwest Chemical Co. 873
Oakite Products, Inc. 861
Optimus Detergents Co. 934
Peninsular Chemical Products Co. 874
Pennsylvania Salt Mfg. Co. 917
Promat Div., Poor & Co. 944
Puritan Mfg. Company 903
Rheem Research Products, Inc. 877
Sarco Company, Inc. 899
Seeley Company, E. E. 953
Sparkler Mfg. Co. 876
Standard Steel Spring Co. 921
Stevens Co., Frederic B. 864
Storts Welding Co. 930
Stutz Mfg. Co. 950
Sulphur Products Co., Inc. 896
Udylite Corp. 954
United Chromium, Inc. 900, 927
U. S. Stoneware Co. 939
Wyandotte Chemical Corp. 918
Zapon Div., Atlas Powder Co. 946
Zialite Corporation 952

EQUIPMENT

PLACE YOUR ORDERS NOW FOR IMMEDIATE DELIVERY

MAC DERMID INCORPORATED is the exclusive distributor for many of this country's largest equipment and metal finishing supplies manufacturers. Be sure and ask our Technical Service Engineer to help you determine your requirements and place your orders now for immediate deliveries

WELDED DIP BASKETS

All welded construction, steady or swinging bail dip baskets in standard sizes or to specifications

WELDED DIP BASKETS

NEOPRENE GLOVES

Recommended better than rubber for toughness and acid resistance.

NEOPRENE GLOVES

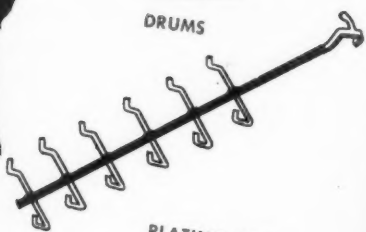
DRUMS

Synthetic rubber-lined steel drums for plating with any type acid solution—55 gal. capacity — $76 00 — F.O.B Detroit

DRUMS

PLATING RACKS

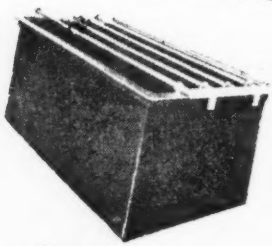
Available in various designs and construction according to requirements.



PLATING RACKS

PLATING TANKS

All descriptions with various types of linings for all plating and finishing operations



PLATING TANKS

WRITE FOR FOLDERS

FOR FASTER PRODUCTION USE INDIVIDUALLY FORMULATED CLEANERS

MAC DERMID INCORPORATED chemicals and compounds for cleaning, finishing and plating are now available in special variations that have been individually developed for specific requirements. Be sure and ask our Technical Service Engineer to demonstrate the compound perfected for your particular need.

ANODEX 61X

Highly efficient compound individually developed for electro-cleaning highly buffed copper with reverse current. Excellent for cleaning copper prior to bright nickle plating. Readily rinsed in cold water.

METEX 77

New non-foaming, easy rinsing alkaline cleaner recently developed for fast, low cost and positive cleaning in spray washers.

METEX 8BB

Exceptionally efficient burnishing compound developed primarily for rolling brass and steel to a high lustre with or without balls.

METEX 11W

Fast and extremely effective compound developed for cleaning at low temperatures with reduced concentrations. Has no heavy soap floatations.

Write for Free Data Sheets on
Cleaning Compounds for Individual Requirements

MAC DERMID

INCORPORATED

WATERBURY 88, CONNECTICUT

WRITE ONE OF THESE SERVICE ORGANIZATIONS FOR FREE DEMONSTRATION

NEW YORK	DETROIT	CHICAGO	CLEVELAND	ST. LOUIS	TORONTO—CAN.
Udylite Corp. (L. I. City)	Udylite Corp. Wagner Bros	Udylite Corp. Geo. A. Stutz Mfg. Co.	Udylite Corp. McGean Chem. Co.	LaSalco, Incorporated	Clark Industrial Supplies Co.

PROTECTING electrical appliances since the toaster replaced the fork

Doing the unusual is daily routine to the electrical appliance industry. Unusual, too, are the requirements called for in the plating equipment that gives modern electrical conveniences their long life and lasting eye-appeal. Finishes must resist or conduct current in varying degrees, must withstand severe thermal shock, and often take the beating of careless use.

In developing such finishes, H-VW-M has worked closely with appliance manufacturers since the home toaster was a novelty.

Even the old toasting fork, which the streamlined "pop-up" has replaced, was plated with H-VW-M equipment. Today, we stand ready to work with *all* industries in the planning and layout of new plating and finishing departments, and to offer technical counsel on the operation and equipment of existing plants. Write us now to find how our century and a quarter background can be applied to your present or anticipated requirements.

HANSON-VAN WINKLE-MUNNING CO.

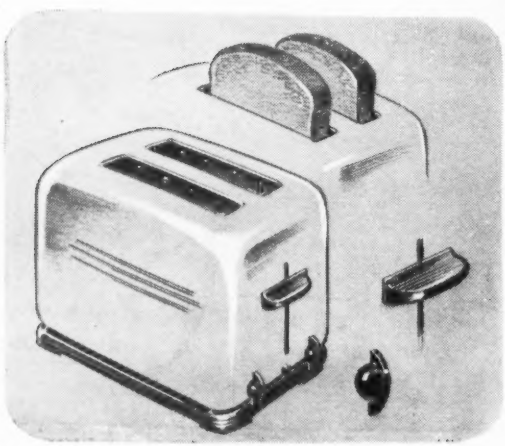
MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing equipment and supplies.

Plants: Matawan, New Jersey • Anderson, Indiana

Sales Offices: Anderson • Chicago • Cleveland • Dayton • Detroit • Elkhart Matawan • Milwaukee • New Haven • New York • Philadelphia Pittsburgh • Springfield (Mass.) • Syracuse

ABRASIVES
ANODES
BRUSHES
BUFFS
BURNISHING BARRELS
CENTRIFUGAL DRYERS
CLEANERS
COMPOSITIONS
CONVEYORS (Semi-Automatic)
CONVEYORS (Full Automatic)
DIPPING BASKETS
GENERATORS
MICROSCOPES (Electroplater's)
PLATING BARRELS
RECTIFIERS
RHEOSTATS (Tank)
TANKS
WHEELS (Polishing)
WRAP-RAX



7499